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PAPER TRADE JOURNAL

JANUARY 24, 1946

Established 1886

Post-War World

"The possibilities for production in the world ahead are fantastic: the greatest pent-up demand in modern history, the greatest productive capacity ever known, the most enlightened scientific force, the greatest amount of genius and invention."

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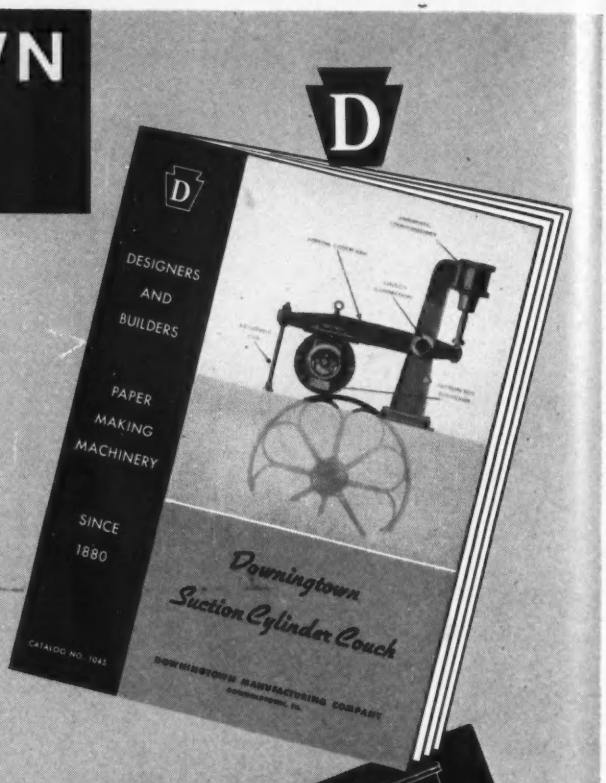

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Our Catalog No. 1045, recently off press, fully illustrates and describes the new Downingtown Suction Cylinder Couch and also tells the pioneering story of the first rolls, installed just before the war. Write for it today.

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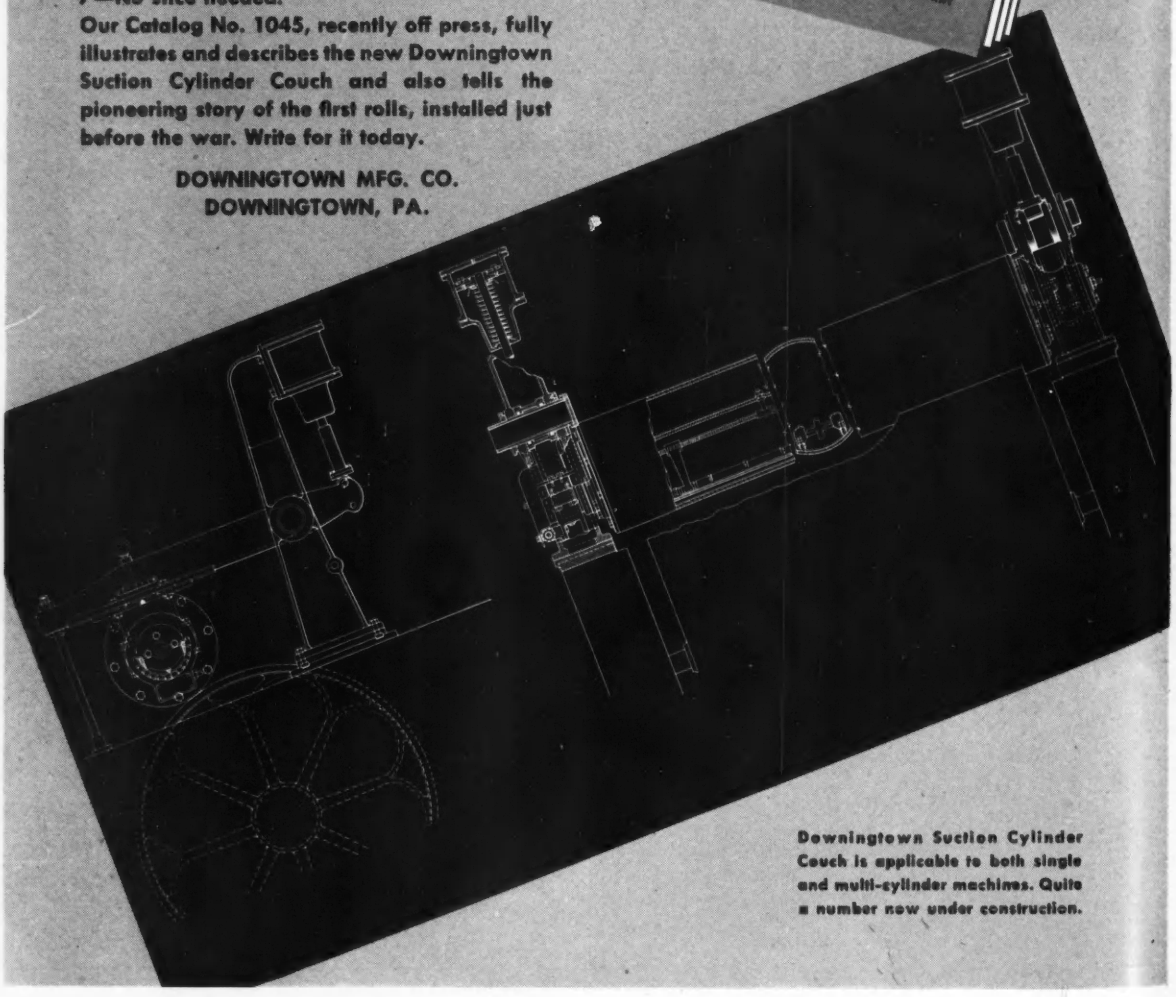

Downingtown Suction Cylinder Couch is applicable to both single and multi-cylinder machines. Quite a number now under construction.

PAPER TRADE JOURNAL

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Established 1872

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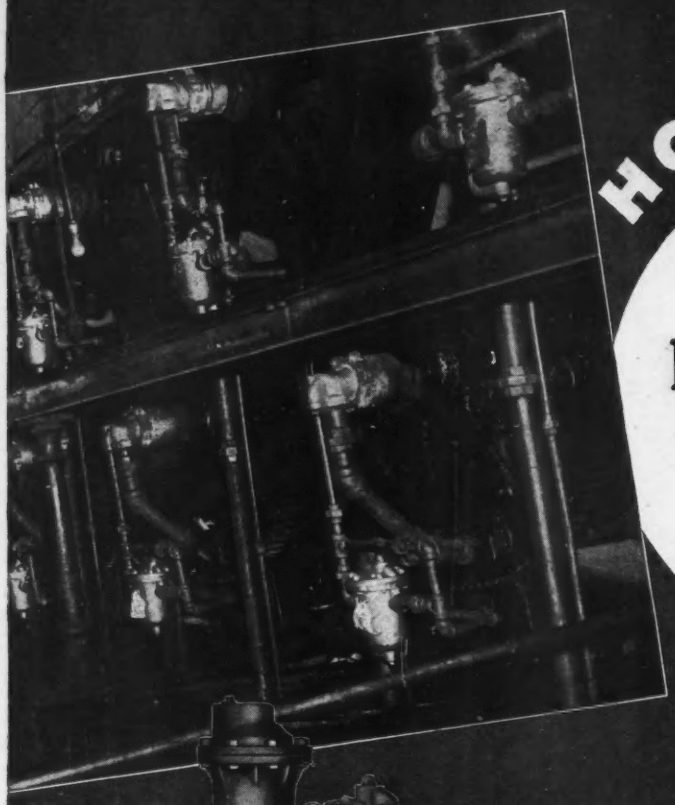

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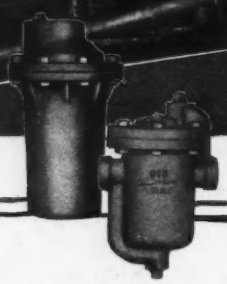

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Vol. 122, No. 4

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

January 24, 1946

Seek Close Coordination in Forestry Field

Wisconsin Conservation Commission Will Discuss Merits of United Forestry Effort At Meeting February 11 With Experts From Paper Mills—Motor Vehicle Official Urges Speed Laws On Bad Roads.

APPLETON, Wis., January 21, 1946—The Wisconsin Conservation Commission, Madison, Wis., is seeking a closer coordination between the state and private interests in the field of forestry. An indication of this is the panel discussion meeting scheduled at Wausau, Wis., next month by the commission, with a large group of forest-using industrial spokesmen, including paper mills.

The meeting will be held February 11. During the last decade or more state policy has been to encourage industrial forestry, particularly by the big paper mills. The larger mills of the Wisconsin River Valley, particularly Consolidated Water Power and Paper Company, Wisconsin Rapids, and Nekoosa-Edwards Paper Company, Port Edwards and Nekoosa, Wis., have long ago taken the lead in reforestation to secure future pulpwood supplies, but the program as a whole in Wisconsin has been relatively small in scope. Total industrial forest holdings at present do not exceed 200,000 acres.

Trees for Tomorrow, Inc., a cooperative reforestation promotion organization sponsored by Wisconsin Valley paper mills, has stirred up a large degree of interest among the wood-using industries of the state, especially among paper manufacturers.

The Wausau session is expected to bring from state conservation administrators statements on their plans with respect to protection of forest acquisition, and reforestation on public and private lands.

Wisconsin had 742 forest fires in 1945, compared with 1,180 in 1944, but the damage resulting to timber was more than doubled last year, rising from $16,956 in 1944 to $43,868, according to Neil Le May, Tomahawk, Wis., chief forest ranger for the state.

One fire in Polk county last March accounted for half of the 8,971 acres burned over in 1945, Mr. Le May said, adding that had it not been for that fire, the state record would have been the best in years. In 1944 there were 9,532 acres burned over. The Polk county fire was attributed to the camp fire of a trout fisherman. The number of "railroad" fires also increased last year, Mr. Le May said, blaming the rise on more travel, poor grades of coal used in locomotives, and the occasional dumping of ashes from train diners.

Normal rainfall last summer and autumn helped reduce the number of fires.

Jay H. Price, Milwaukee, Wis., regional forester of the United States Forest Service, said there were 47 fires on the Nicolet and Chequamagon National forests in Wisconsin in 1945, compared with 78 in 1944. He reported a total of 664 acres burned last year.

Urges Speed Laws on Bad Roads

R. C. Salisbury, director of safety, Motor Vehicle Division of Wisconsin, addressing the Twin City Safety Council meeting Tuesday evening, January 15, at the Neenah (Wis.) High School, urged laws to control speed on bad stretches of road, and control of service years of automobiles. He said the state has about 2,700 miles of "bad" road stretches, and that defective equipment in old cars causes 10% of accidents.

Mr. Salisbury said that last year 618 persons were killed on the highways of the state, representing a 22% increase over the preceding year. He pointed out that industry years ago began a fight to reduce accidents, and that a similar campaign must be waged against highway accidents.

More Water in Reservoirs

A gain of 1,041,000,000 cubic feet in the Wisconsin Valley Improvement Company's reservoirs for the week ending January 13 was shown in a company report issued January 16. High precipitation over the previous weekend and unseasonable melting of snow and ice at that time was reflected in the gains, the first reported in several weeks. Total storage on January 13 was 12,019,000,000 cubic feet, the highest figure for the date during the last decade except in 1939 when the storage totalled 12,512,000,000 cubic feet.

To Lecture on Atomic Energy

Dr. J. A. Vanden Akker, research associate at the Institute of Paper Chemistry, Appleton, and R. H. Jebens, a research chemist at Kimberly-Clark Corporation, Neenah, Wis., will give a lecture on atomic energy Tuesday evening, January 22, at Science Hall, Lawrence College, Appleton, before the local section of the American Chemical Society. Both have worked on atomic structure. A 6:30 dinner at the Copper Kettle, Appleton, will precede the lecture.

Drivers Receive Safety Awards

Eight truck drivers of Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., received awards for safe driving January 16 from the

(Continued on page 46)

Claim Loss in Transporting Wood and Paper

Railway Association of Canada Argues For Coordination of Federal And Provincial Laws For All Transportation Services—New Highs Recorded In Newsprint Exports — Other Late Industrial News.

MONTREAL, Que., January 21, 1946—Widespread publicity has been given by the press in Canada to the claim that pulpwood and newsprint are carried by the railways at a loss. The claim was made on behalf of the Railway Association of Canada in an address in Montreal by F. A. Gaffney, transport economist for the Government system of railways, which in 1945 transported more than 80,000 carloads of newsprint. It was part of an argument he presented for a new system of transportation regulation in the Dominion, the only sound basis for which, he said, was the co-ordination of federal and provincial regulations under a central authority to ensure uniformity by the nine provinces and to provide machinery for the control of interprovincial and international highway services. Unless such a policy were adopted, and the railways permitted to earn sufficient net revenues to ensure their continuance, he predicted that there would be a return to the impoverishment that endangered the railway structure in 1939. (At present operations of trucking concerns are wholly within the jurisdiction of the respective provinces, while the railways are under federal jurisdiction).

He was not necessarily arguing for a specific increase in the rates on pulpwood and newsprint, but for such provisions as would correct the situation whereby highway transportation by trucks takes the cream of profitable traffic from the railways and leaves them with all the unremunerative freight, movement of which at low cost is essential to the economy of the whole country. Under the present rate structure such primary commodities as wheat, coal, lumber, pulpwood and newsprint are transported by the railways at ½ a cent a ton mile, a rate without which these commodities could not be marketed, but which represents only half the cost of moving all freight. Fifty per cent of railway freight, he said, was carried at below cost. On the other 50% the rates were sufficiently high to offset this loss.

Return to peace conditions had brought the railways face to face with the same critical conditions that threatened their operation in 1939, when trucks moved 4.6% of the traffic and got 20% of the total transport revenue, which meant that the railways performed 95.4% of the work and got only 80% of the revenues. The trucks, he said, only moved traffic bearing rail rates which paid 4 to 8 cents a ton mile, and would not touch traffic that paid 1 cent to 3 cents a mile. The trucks were able to do this because the highways over which they operated were provided at public expense and the trucking concerns did not pay their full share for the maintenance of them, whereas the railways not only provided and maintained their own roads, but were taxed to help pay for the highways used by the trucks.

He mentioned that a train of 100 cars, operated by five men, could carry 400 tons of freight at approximately a cost of $2 a ton mile over a given distance, whereas the movement of an equivalent amount of freight by truck would require the use of 800 trucks and 800 truck drivers, at a cost of $22 per ton mile. He added that if the railways abandoned their present rate structure for a flat rate of 1 cent per ton mile on all classes of freight every over-the-road trucker in the Dominion would go out of business, because they could not exist on such a rate, whereas the railways could. Conversely, if pre-war conditions of competition were continued and, as was likely, trucking concerns proceeded to capture progressively larger proportions of the cream of the traffic, then the existence of the railways would be imperilled.

To Protect Pulpwood Supply

According to the annual report of the federal Timber Controller, a letter is being sent out to all exporters to the effect that it is the intention of the controller to protect the limited number of Canadian pulp and paper mills which must have a proportion of their supply of peeled wood, both from the point of view of demand, and also for a competitive quality demand. This is taken to indicate that some measure of protection will be forthcoming for certain mills dependent for a portion of their supply on purchases of pulpwood cut by neighboring farmers from their private wood lots. There have been complaints from such mills that they have been seriously embarrassed by representatives of U. S. companies buying up every stick of pulpwood available from the farmers in their areas, forcing these companies to go farther and farther afield for their supplies, with accompanying higher costs due to long-range transportation, and continuity of supply highly speculative.

The forest areas under lease in Canada at present were about equal to the total area of Sweden. He spoke of the industry in British Columbia as only in its infancy, saying of the 34 newsprint mills in Canada only two were on the Pacific Coast, and these obtained a substantial part of their wood supply from the famous Queen Charlotte Islands, the home of big timber. Mentioning the pre-eminent part the industry had played in developing hydro-electric energy in the Dominion, Mr. Fisk said that in a large newsprint mill a single machine, costing as much as $2,000,000, used considerably more electric energy than is required to light the combined cities of Montreal and Toronto.

Britain May Relax Newsprint Ban

Holding out the prospect that Canada might benefit from "a slight relaxation of import controls" by Britain, Sir Stafford Cripps, president of the British Government's Board of Trade, told a conference of Canadian newspapermen on Thursday that a date in April next has been set for a further discussion of newsprint imports. This has reference to the fact that last October 1946 contracts calling for 224,000 tons of newsprint from Canada and Newfoundland were reduced to 50,000 tons. Sir Stafford emphasized that "austerity" governed all Government policy, and said the matter to be decided relative to newsprint was whether Britain could afford 8-page newspapers, rather than 4-page issues, to which the daily press is now confined, as it was during the war.

Successful Combinations

EAGLE-A

PAPERS

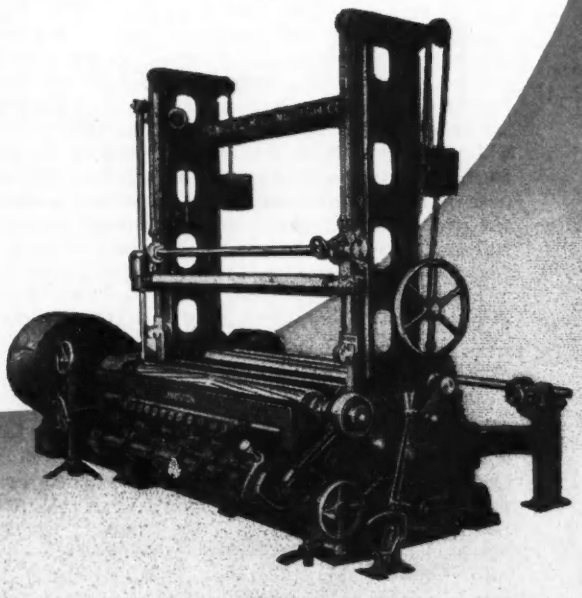
Oh, nature's noblest gift, my gray goose-quill!—BYRON.

The poet praised his quill—but without *paper* his message would have perished. Just as pen and paper are interdependent, so are production *know-how* and the machines that are part of the processing.

American Writing Paper Corporation, whose Eagle-A Papers are so widely known, is another in the long list of prominent firms using Langston Slitters and Roll Winders.

Here, as with many other products, Langston's are doing a good job in the process of making fine paper. There is a type and size to meet every need.

SAMUEL M. LANGSTON COMPANY
CAMDEN, NEW JERSEY



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Midwest Pleased With New OPA Adjustment

New Book and Newsprint Regulations Viewed As Constructive Step To Effect Equitable Prices and To Expedite Production—Salesmen To Hold Annual Meeting During Paper Week — Other News.

CHICAGO, Ill., January 21, 1946—The Chicago paper market was busily engaged in observing just how, in practice, the new book paper and newsprint regulations from the Office of Price Administration were affecting the trade. The price increases, resulting in certain cases not from actual over-all boosts but from the increase in differentials, were expected to materially aid production in direct ratio to availability of raw materials and to eliminate some confusing situations centering around the various grades and weights of the papers affected—especially book.

According to reports, the procedure of permitting the jobber his regular mark-up on the mill increases would make it possible for this end of the trade to get away from the "squeeze" which is the ultimate effect of the government's cost absorption program in the retail industry in general.

Specifically, there were no reasons to do other than note the trend towards normalcy in a very few lines, though manpower shortages, seasonal inability to get into the pulp region and shortages of allied ingredients continued to present genuine difficulties from a supply standpoint. The industry, in general, seemed pleased with the OPA's recognition of the need for revisions of cost to secure equitable mark-ons and to expedite production.

Salesmen to Hold Annual Meeting

The Salesmens Association of the Paper Industry will again this year feature its novel and time and travel conserving program of "split" annual meeting with the decisions of the two divisions carried to New York for final action. The western division, under the direction of Forrest "Pat" Patterson, Flambeau Paper Company, and western vice president, will hold its version of the "annual meeting" on February 11. At that time annual reports will be presented covering the activities of the various committees, the treasurer's report and approval of a slate of officers for the ensuing year. On February 25, Mr. Patterson and other officers and members of the western division will journey to New York for the annual industry meetings of the trade. At that time what formal business of the two divisions which must be handled as one group election of a national president et cetera, will be taken care of by representatives of both the western and eastern divisions.

The plan, tried out in early War days is reported to have created some distinct advantages not only in time saving but in concentrating local interest in the activities of the respective divisions.

Higher Tax on Paper Merchants Possible

There is a strong possibility that paper merchants whose sales are taxable under the Illinois Retailers Occupation tax will be faced with an increase in the tax rate in the not too far distant future. A special Soldiers Bonus Committee of the Illinois Legislature has been holding a series of lengthy hearings on the subject of financing bonuses which are expected to cost a minimum of $400,000,000—around $500 per Illinois veteran. Should the plan be approved at a special referendum, in the event a special session of the legislature is called to approve such a move, it begins to look as though the revenue would have to come from boosting the current sales tax rate from 2% back up to 3% where it was two years ago.

Return to Moser Co. from War Service

Two news items come this week from the Moser Paper Company, Chicago fine paper distributors. The first has to deal with the return to the company of Lt. Commander P. A. Van Vlack who spent over three years in Navy service. The second deals with the addition to the sales staff of R. D. Ross, recently chief of the commercial printing section of the Printing and Publishing Division, War Production Board. Prior to his service with the government agency Mr. Ross was identified with R. R. Donnelley & Sons, Chicago printing firm.

Wisconsin Merchants Elect Semmes

MILWAUKEE, Wis., January 19, 1946—The Wisconsin Paper Merchants Association, at its recent annual meeting elected the following slate of officers. President, David Semmes, Service Paper Company, Racine; Vice-President, E. J. Schrage, Universal Paper Company, Appleton; Treasurer, Charles Hafemann, Hafemann Paper Company, Milwaukee; for Executive Secretary and Counsel, John L. Richey of Cincinnati. These plus Harry J. Voelker, W. H. Kranz Company, Racine and Lee Stevens, Flint Paper Company, Milwaukee, constitute the board of directors of the Association.

David Semmes the newly elected President was also elected as a director in the wrapping paper division of the National Paper Trade Association. Among other practical matters discussed at the meeting was the advisability of manufacturers stenciling the description of packages containing paper and paper products on the two small sides of the package so that when stacked in warehouse the merchandise could be more economically and quickly identified in filling orders. The necessity of a revision of the cost system for paper merchants supervised by the National Paper Trade Association was included and by resolution, the National Paper Association was requested to appoint a special committee to investigate the need for such revision.

George Clark Joins Kimberly-Clark

NEENAH, Wis., January 19, 1946—George L. Clarke, for the past ten years connected with International Paper Company's Southern Kraft division at Camden, Ark., has joined the pulp department staff of the Kimberly-Clark Corporation. Mr. Clarke will be attached to the office of W. H. Swanson, an assistant general superintendent for Kimberly-Clark, with responsibilities which will primarily revolve around sulphate pulping operations. He is a graduate of the University of Minnesota and the Institute of Paper Chemistry.

Talk about wet strength . . .

Filled with water, this paper bag will not break. Its greater wet strength is provided by Uformite urea formaldehyde resins.

. . . and you'll talk about these resins!

UFORMITE 467

For Kraft—Add this urea formaldehyde resin directly to the beater and you'll obtain substantial improvements in wet strength—as well as increased dry, Mullen, tensile and fold strength—will be able to use less expensive pulps.

Its low cost plus ease of application make it an invaluable aid in the production of bag and wrapping paper, food wrapping, towelling, blueprint and map paper.

And Uformite 467 in no way affects the color, odor or taste of the paper—requires no special equipment to prepare the resin.

UFORMITE 470

For Rag, Sulfite and Ground Wood

To produce such papers as high wet strength glassine, light weight absorbent tissues, sulfite wrapping paper, chart and ledger papers, Uformite 470 is especially effective.

This urea formaldehyde resin is ideal for pulps when minimum acidity is essential. Acid may be used as the sole catalyst if alum is undesirable.

Uformite 470 requires no special handling, aging or pre-treatment. Added at the head box, chest or fan pumps, Uformite 470 imparts high wet and dry strength durability.

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THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Chillicothe Plans More Capacity

CHILLICOTHE, Ohio, January 21, 1946—Austin P. Story, President of the Chillicothe Paper Company, disclosed last week plans for an expansion program designed to increase production capacity 60 per cent and add approximately 100 names to the present total of 250 on the company's payroll. The expansion will include addition of a new and larger paper machine with auxiliary equipment and installation of a new power plant, Story said. He expected construction to be begun by March 1. However, due to the fact that it will take 15 months to get delivery on the new paper machine, operation of the expanded facilities will not begin until spring or the summer of 1947, he added.

The company, which produced writing and book papers, now has a capacity of 22,000 tons a year at the Chillicothe plant. This will be increased to 35,200 tons when the expansion work is complete.

The new paper machine will be a 175-inch fourdrinier. It will call for auxiliary equipment including additional beater room facilities.

A new high pressure boiler and a 4,000 kilowatt turbine will go into the new power plant building which will measure 90 by 40 feet. It will replace the present 25-year-old power system.

Container Plant Awarded to Rust

PITTSBURGH, Pa., January 19, 1946—Contract for paperboard making facilities, which will approximately double the floor space of the local plant of Container Corporation of America, has been awarded to The Rust Engineering Company, as designer and constructor. The new installations will enable Container to convert pulp, which it currently manufactures at Fernandina, into paperboard at the same site.

The expansion will comprise five brick and steel buildings for a Fourdrinier paperboard machine trimming 160 inches, and for diffuser, screen, stock preparation and rolled storage facilities. A power plant with 100,000 lbs. boiler, new 6,000 KW turbine, evaporating equipment and enlarged employe facilities will also be installed.

When completed, it is contemplated the Fernandina plant will continue to ship pulp as well as paperboard. As one of the largest users of kraft paperboard, Container will continue to purchase substantial tonnages of kraft board from other mills in addition to consuming its own production of that grade.

Sidney Starts New Roofing Plant

VANCOUVER, B. C., January 19, 1946—Construction has commenced on the new $85,000 roofing plant building for the Sidney Roofing and Paper Company Limited. Logan Mayhew, vice-president, states the contract has been placed with George Wheaton, Victoria contractor. During the construction of the new plant, 25 to 30 men will be given employment for some months. Upon completion, the plant will require a permanent staff of around 10 men in addition to those already employed.

The new plant, to be added to the present pulp mill building, will have modern, up-to-date fabricating machinery installed, to greatly increase the output of rolled roofing and asphalt shingles. When completed, investment in building and machinery will total some $150,000. The present pulp mill machinery will be moved to a more convenient site in another building at present under construction.

International Adopts Retirement Plan

NEW YORK, N. Y., January 21, 1946—International Paper Company today announced the adoption of an Employees' Retirement Plan for its employees and those of its United States subsidiaries which will cost the Company nearly $6,000,000 to provide benefits for past service alone. The Plan covers all fulltime employees at least 30 years old with five years or more of continuous service, and will be in addition to old age benefits under Federal Social Security.

Under the Plan the Company will bear the entire cost of benefits for work prior to February 1, 1946, and will share with its employees the cost of benefits for service after that date. In addition to the $6,000,000 provided by the Company for past service benefits, present estimates indicate that the cost of future service benefits will be shared approximately 60 percent by the Company and 40 percent by the employees.

The International Paper Company has established a trust fund with the Bankers Trust Company, New York, as Trustee to hold and manage all funds of the Plan. The Company has already deposited $1,500,000 in this fund to be augmented by annual payments from the Company and by regular contributions from employees. A Retirement Board composed of seven employees of the Company and its subsidiaries appointed by the Board of Directors will administer the Plan.

Participation in the Plan is entirely voluntary. Starting February 1, 1946 employees will contribute two and a quarter percent of their pay up to $3,000 a year and four and a half percent of their pay above $3,000 up to $15,000 a year.

Employees who are members of the Plan are eligible for retirement benefits at the age of 65 years or as early as 55 years if they have been with the Company for 20 years or more. Although several options are provided, the normal benefits under the Plan for employees who retire at 65 years are regular monthly payments computed on the basis of number of years of service and rate of pay.

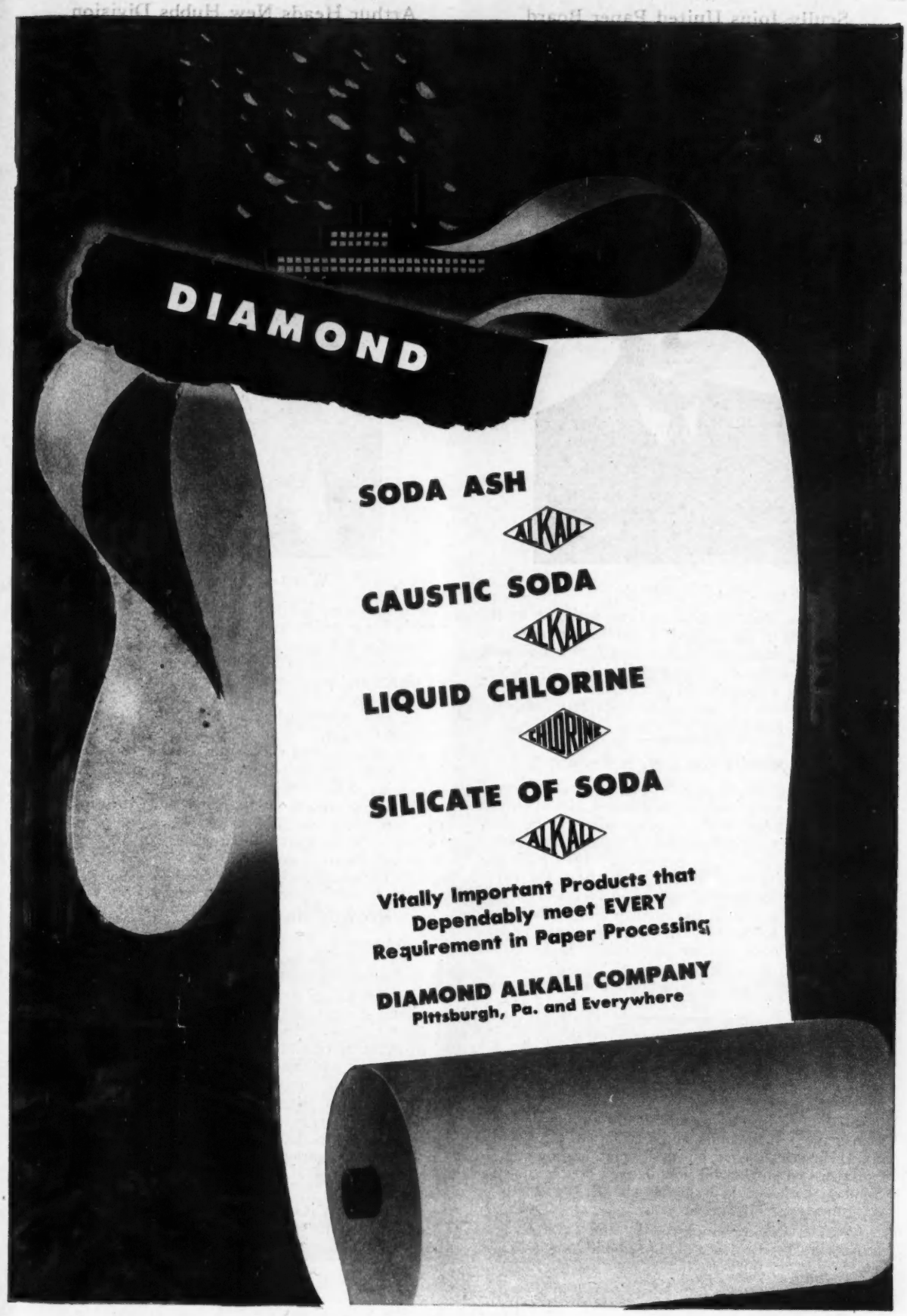
The Plan includes provisions which assure members or their heirs the return of all their own contributions plus interest. In no case will a member contribute more money to the Plan than he, or his heirs, will receive from it plus accrued interest. The Plan provides various optional methods under which a member upon retirement may provide for a beneficiary who survives him.

Employees of the International Paper Company and its subsidiaries in military service are considered as still employed by the Company for the purposes of the Plan and are eligible just as though their service with the Company were uninterrupted.

Employees of the Companies listed below are eligible for membership in the Plan: International Paper Company, Bagpak, Inc., George and Sherrard Paper Co., (only for service since October, 1927), I. P. Container Corporation, International Envelope Corporation, International Records Corporation, International Paper Sales Company, Inc., (only employees at offices in the U. S.), Montague Machine Company, Southern Kraft Paper Company, Southern Kraft Timberlands Corporation.

Compton Joins Georgia Kaolin

ELIZABETH, N. J., January 16, 1946—James H. Compton, Jr. has joined the technical and sales service staff of the Georgia Kaolin Company. For the past four years he has been employed by General Mills Inc.


DIAMOND
SODA ASH
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LIQUID CHLORINE
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SILICATE OF SODA
ALKALI
Vitally Important Products that
Dependably meet EVERY
Requirement in Paper Processing
DIAMOND ALKALI COMPANY
Pittsburgh, Pa. and Everywhere

Scully Joins United Paper Board

Lt. Comdr. James R. Scully has been named as sales representative of the United Paperboard Company by Harold W. Kephart, vice-president. Scully has just been released by the U. S. Navy after three years active duty. Prior to receiving his commission in 1942, he was president of James R. Scully and Company, New York, exporters of packaged frozen foods. From 1929 to 1940 he was assistant to the vice-president of the Atlantic Coast Fisheries Export Corporation, where he devoted much of his time to packaging problems. This included the purchasing of packaging materials, the development of package designs, the setting up of specifications, and the supervision of tests.

JAMES R. SCULLY

Reynolds Back with Brown

Jack Reynolds returned after nearly five years' service in the armed forces, on January 2nd to Brown Company as towel sales representative in the New England States. Mr. Reynolds enlisted in the Naval Reserve as a S 1/c in September, 1940 and was called for active duty shortly thereafter. He participated in the landing operations in North Africa in the Fall of '42, and in the Sicilian and Italian campaigns of the following year. Soon afterward he was sent to the Pacific, taking part in the invasions of Leyte, Lingayen Gulf, Luzon and Okinawa. When discharged last November, he held the rating of Chief Yeoman.

Oxford and Brown Grant Raises

RUMFORD, N. H., January 19, 1946—Wage increases in the Oxford Paper Co. here, and in the Brown Paper Co., Berlin, N. H., have recently been granted to workers as a result of negotiations between management of the mills, and the United Mine Workers, Irving DesRoches, business agent, has announced.

Oxford employes will now be paid double time for Sunday work, while wages at the Brown company were increased 11 cents an hour.

About 2,000 are employed by the Oxford company, while the Brown mill hires about 2,500 workers.

Arthur Heads New Hubbs Division

In line with their spirit of advancement and expansion, to meet changing conditions and needs, Charles F. Hubbs & Company has established a food packaging division handling and distributing all types of materials used in the preserving and packaging of perishable foods. The specialty of this division will be containers and protecting wrappings for frozen foods, which are beginning to play such an important part in home, restaurant, and hotel economics. Dairies, creameries, bakeries, locker plants, frozen food processors, ice cream manu acturers, super markets and all plants and processors having to do with the sanitary preservation of food stuffs, will find here the items with which their varied needs can be satisfactorily cared for.

WILLIAM H. ARTHUR

This new division will be supervised by a man having a long and varied experience in the paper and packaging field, William H. Arthur, who was formerly vice-president of the Beach and Arthur Paper Company, and for the last five years has been connected with the Container Corporation of America. This new division under Mr. Arthur will be located at 389 Lafayette Street, New York 3, N. Y.

Brownville Paper Elects Pease

BROWNVILLE, N. Y., January 19, 1946—On January 15, 1946, the older stockholders of Brownville Paper Company, including Samuel A. Upham, sold all their holdings in this company. The total outstanding stock of the company has been acquired by Robert L. Pease, Seymour M. Jones, James H. Lingenfelter, Alfred L. Soper and Albert W. Horr. Mr. Upham will retain his 50 years connection with the company in the newly created position of chairman of the board of directors. The other officers will be: Robert L. Pease, president; Seymour M. Jones, vice-president; James H. Lingenfelter, treasurer; Alfred L. Soper, secretary; Albert W. Horr, assistant secretary. Howard M. Root will continue as superintendent.

The company is operating at capacity on its regular grades of manifold, carbonizing and supercalendered papers.

SPENT LIQUOR EVAPORATORS

NATURAL AND FORCED CIRCULATION

Efficiency, reliability, consistent performance, low operational and maintenance costs have been for years outstanding and recognized characteristics of GOSLIN-BIRMINGHAM multiple-effect EVAPORATORS for the concentration of sulphate and soda pulp mill black liquor and spent sulphite acid liquors.

G-B EVAPORATORS may be found in most pulp mills throughout the country. The general acceptance of G-B equipment is a tribute to experience and to the performance records of GOSLIN-BIRMINGHAM products.

GOSLIN-BIRMINGHAM MANUFACTURING CO., INC.

BIRMINGHAM ALABAMA

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CHICAGO SAN FRANCISCO NEW ORLEANS SEATTLE

Annual Meeting Program

Technical Association of the Pulp and Paper Industry

Commodore Hotel, New York, N. Y., February 25-28, 1946

MONDAY, FEBRUARY 25, 1946

10:00 A.M. GENERAL SESSION (Grand Ball Room)
VANCE P. EDWARDES, President, Chairman

1. *Secretary's Report,* by R. G. Macdonald.
2. *President's Address,* by Vance P. Edwardes.
3. *Teller's Report.*
4. *Joint Textbook Committee Report.*
5. *Patents Committee Report,* by C. W. Rivise.
6. *The Patent Office,* by Hon. Casper W. Ooms, U. S. Commissioner of Patents.
7. *The MM Proposal,* by J. H. Londergan, National Paper Trade Association.

2:00 P.M. COMMITTEE MEETINGS (Grand Ball Room)

(All committees unless otherwise indicated will meet to discuss the present and future plans of each committee).

2:00 P.M. FIBROUS AGRICULTURAL RESIDUES SESSION (Room B-C)

S. I. ARONOVSKY, Northern Regional Laboratory, Chairman

Round-table Discussion and Committee Meeting.

2:00 P.M. COATING SESSION (East Ball Room)
MISS R. M. K. COBB, Lowe Paper Co., Chairman

1. *Supercalendering of Machine Coated Paper,* by E. E. Thomas, Appleton Machine Co.
2. *Discussion of Monograph on Coating Pigments* and Committee Meeting.

2:00 P.M. OPTICAL PROPERTIES SESSION (West Ball Room)

A. H. CROUP, Hammermill Paper Co., Chairman

1. *The Color Aptitude Test,* by John L. Parsons, Hollingsworth & Whitney Co.
2. *Geometric Identification of Reflectance and Transmittance Measurements,* by R. S. Hunter, National Bureau of Standards.
3. *Quantitive Measurement of Fading by Photoelectric Tristimulus Method,* by R. S. Hunter.
4. *The Standard Fading Arc at the National Bureau of Standards and a Method of Calibrating Other Lamps in Terms of It,* by H. F. Launer, National Bureau of Standards.
5. Committee Meeting.

TUESDAY, FEBRUARY 26, 1946

R. H. SIMMONS, Government Printing Office, Chairman

9:30 A.M. GRAPHIC ARTS SESSION (West Ball Room)

1. *Curling of Lithographic Paper,* by Robert F. Reed, Lithographic Technical Foundation.
2. *The Measurement of Tone Reproduction of Half-Tone Prints and Uniformity of Solid Prints,* by Rolf Buchdahl and M. F. Polglase, Sun Chemical Corp., and H. C. Schwalbe, Mead Corp.
3. *Future Trends and Requirements by Users of Printing,* by W. C. Huebner, Consulting Engineer.
4. *Progress in Printing,* by F. A. Weymouth, International Printing Ink Co.
5. *The Effective Evaluation of Paper Surfaces for Printability,* by V. V. Vallandigham, Kelco Co.

9:30 A.M. ALKALINE PULPING SESSION (East Ball Room)

K. G. CHESLEY, Crossett Paper Mills, Chairman

1. *A New Method for the Control of Sulphate Digesters,* by R. D. Cowherd, the Bristol Co.
2. *The Temperature Effects Associated with Specific Gravity Measurements,* by R. D. Cowherd.
3. *Effects of Diluent Black Liquor in Sulphate Pulping,* by Henry C. Crandall and G. F. Enderlein, Mosinee Paper Mills.
4. *Potentiometric Determination of Sodium Sulphide in Sulphate Pulp Black Liquor,* by P. B. Borlew and T. A. Pascoe, Nekoosa Edwards Paper Co.
5. *Production of Bleachable Sulphate Pulps from Rapid Growth Douglas Fir,* by J. Stanley Martin, Forest Products Laboratory (by title).
6. *Effect of Continuous Liquor Flow in Pulping by the Sulphate Process,* by S. L. Schwartz and M. W. Bray, Forest Products Laboratory (by title).

9:30 A.M. ACID PULPING SESSION (Grand Ball Room)

G. H. MCGREGOR, Minnesota & Ontario Paper Co., Chairman

1. *Sulphite Pulping and Pulps,* by Sigge Ekman, Rhinelander Paper Co.
2. *Evaluation and Classification of Sulphite Pulps,* by E. G. Ingalls, Wausau Paper Mills.
3. *Sulphite Pulp Production Records,* by Harold Bailkowsky, Pulp Div., Weyerhaeuser Timber Co.
4. *The Sulphite Process, Its Position in the Chemical and Paper Fields Today,* by Rex Vincent, Bulkley, Dunton Pulp Co.

9:30 A.M. GENERAL SESSION (Room B-C)

G. W. E. NICHOLSON, Union Bag & Paper Corp., Chairman

1. *Instrumentation in Pulp and Paper Mills,* by John N. Franklin, Bowater's Newfoundland Pulp and Paper Mills, Ltd.
2. *Paper Mill Operating Efficiencies,* by H. H. Brown, Consulting Engineer.
3. *Steps in the Development and Commercialization of New Paper Products,* by R. S. Aries, Polytechnic Institute of Brooklyn.
4. *Continuous Refining,* by D. Manson Sutherland, Sutherland Refiner Co.

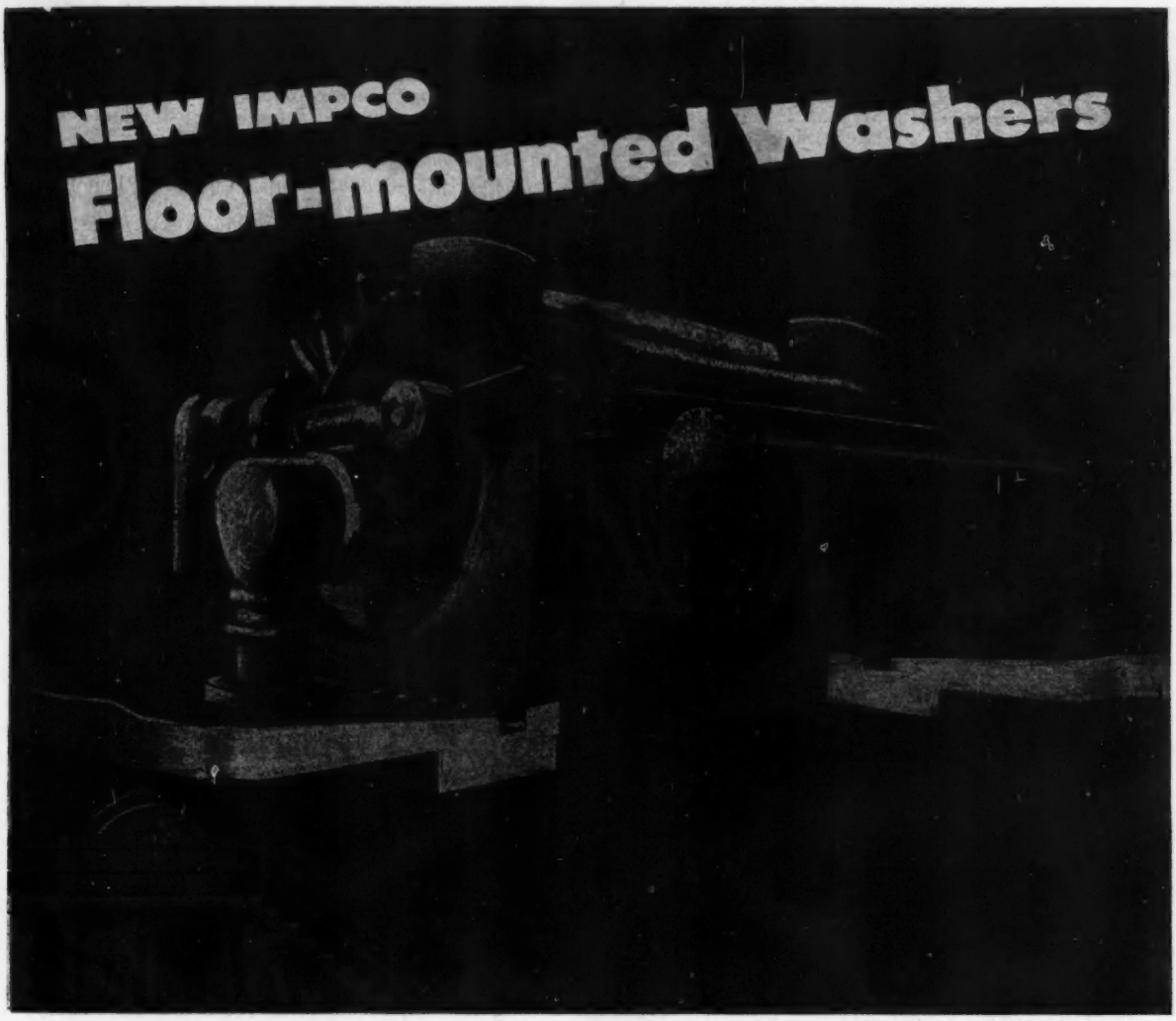
2:00 P.M. FUNDAMENTAL RESEARCH SESSION (East Ball Room)

H. F. LEWIS, Institute of Paper Chemistry, Chairman

1. *A Place for Physicists in the Pulp and Paper Industry,* by R. N. Greisheimer and R. H. Savage, Mead Corp.
2. *The Manufacture of Viscose Pulp from Sugar Maple,* by Clinton W. Tasker and C. E. Libby, New York State College of Forestry.

(Continued on page 26)

NEW IMPCO Floor-mounted Washers



- *Eliminate stairs and platforms.*
- *Reduce piping costs.*
- *Save operating labor.*
- *Save labor of washing platforms, stairs and floors underneath.*
- *Eliminate wet, sloppy floors. Floors can drain toward machine.*
- *Reduce risk of accidents.*

The washer is mounted in the floor at a convenient height for easy observation. No need for stairs and platforms with their costly companions—unnecessary hosing and risk of accidents. The same washer, without changes, can be mounted above existing floors.

Write for information about this washer and our catalog describing complete mill equipment.

IMPCO

Improved PAPER MACHINERY CORPORATION

NASHUA, NEW HAMPSHIRE

TAPPI ANNUAL MEETING PROGRAM

(Continued from page 24)

3. *The Suitability of Yellow Birch for Glassine Paper Manufacture,* by John E. Feola and C. E. Libby, New York State College of Forestry.
4. *The Production of Wood Sugar in Germany and Its Conversion to Yeast and Alcohol,* by J. F. Saeman, E. G. Locke, Forest Products Laboratory, and G. K. Dickerman, Consolidated Water Power and Paper Co.
5. *First Cut Cotton Linters,* by E. M. Brennan, Railway Equipment & Mfg. Co.
6. *The Importance of the Fine Structure in the Cellulose Fiber for the Understanding of Cellulose Reactions,* by Emil Heuser, Institute of Paper Chemistry (by title).
7. *Manufacture of Pulp and Paper and Related Products from Wood in Western Germany,* by J. N. McGovern, Forest Products Laboratory (by title).
8. *Relative Toxicity of Disinfectants Recommended for Use in the Paper Industry—III Inhibiting Concentrations of Additional Disinfectants for* Aerobacter Aerogenes, Bacillus Mycoides, *and* Aspergillus Niger, by John W. Appling and John F. McCoy, Institute of Paper Chemistry (by title).
9. *Thiophenol Spruce Lignin,* by F. E. Brauns and William H. Lane, Institute of Paper Chemistry (by title).
10. *Cross-Linkages in Cellulose and Their Practical Implications,* by Emil Heuser, Institute of Paper Chemistry (by title).
11. *The Reactions of Thio Compounds and Lignin,* by F. E. Brauns and M. A. Buchanan, Institute of Paper Chemistry (by title).
12. *Chlorite Holocellulose, Its Fractionation and Bearing on Summative Wood Analysis and on Studies of the Hemicellulose,* by Louis E. Wise, Maxine Murphy and Alfred A. D'Addicco, Institute of Paper Chemistry (by title).
13. *Comparative Estimations of Carbonyl and Carboxyl Groups in Chromium Trioxide and Hypochlorous Acid Oxycelluloses,* by Boonyium Meesook, Mass. Inst. Technology, and C. B. Purves, McGill University (by title).

2:00 P.M. ALKALINE PULPING AND PAPER DEINKING SESSION (West Ball Room)

W. F. GILLESPIE, Gaylord Container Corp., and FREDERICK C. CLARK, Consulting Engineer, Chairmen

1. *Clarification of Green Liquor,* by J. M. Kahn and E. G. Kominek, Infilco, Inc.
2. *Production and Fuel Rates for Rotary Kilns Burning Lime Sludge,* by Ralph Gibbs, Consulting Engineer.
3. *Improvements in Evaporator Engineering,* by R. E. Bergstrom and J. R. Lientz, Swenson Evaporator Co.
4. *Washing of Deinked Bookstock,* by H. P. Bailey and A. H. Nadelman, International Paper Co.

2:00 P.M. ACID PULPING SESSION (Grand Ball Room)

G. H. MCGREGOR, Chairman

1. *Magnesium Base Sulphite Pulping,* by R. S. Hatch, Pulp Div., Weyerhaeuser Timber Co.
2. *Ammonium Base Sulphite Pulping.*
3. *Hydraulic Barking of Small Logs,* by a representative of Allis-Chalmers Mfg. Co.
4. *Sulphite Pulps—Handling and Treating After the Digester,* by George H. McGregor, Minnesota & Ontario Paper Co.
5. *The Ring Type Hydrobarker* (with motion picture), by Joseph E. Holveck, Worthington Pump and Machinery Co.
6. *An Analysis of a Few Predominant Problems in a Sulphite Mill,* by Gust Johanson, Penobscot Chemical Fiber Co.
7. *Studies of Dielectric Properties of Chemical Pulps—I. Methods and Effect of Pulp Purity,* by Cyril Delevanti, Jr. and Paul B. Hansen, Institute of Paper Chemistry (by title).
8. *Studies of Dielectric Properties of Chemical Pulps—II. Studies of Certain Factors Influencing the Dielectric Strength of Paper,* by Daniel O. Adams, Institute of Paper Chemistry (by title).
9. *Evaluation and Reduction of Pitch Trouble in Sulphite Pulp and Pulping,* by Otto Kress and Philip E. Nethercut, Institute of Paper Chemistry (by title).
10. *Experimental Sulphite Pulping of Eastern White Pine,* by Carl O. Skoggard and C. E. Libby, New York State College of Forestry (by title).

2:00 P.M. ENGINEERING SESSION (Room B-C)

W. G. MACNAUGHTON, News Print Service Bureau, Chairman

1. *Fundamental Principles in Applying Motor Drive to Various Mill and Finishing Room Auxiliaries,* by J. L. Van Nort, The Reliance Electric & Engineering Co.
2. *The Press Section of a Newsprint Machine—A Study of Suction Presses and Their Relation to Drying Paper,* by F. A. Garrett, Canadian International Paper Co.
3. *A Stock Inlet for Paper and Paperboard Machines,* by S. A. Staege, Black-Clawson Co.
4. *Heat Transfer Calculations for the Paper Machine,* by A. E. Montgomery, J. O. Ross Engineering Corp.
5. *Corrosion Resistant Metal Covered Rolls,* by C. G. Watson, Youngstown Welding & Engineering Co.
6. *A Method of Ascertaining the Rate of Drying of Paper and Paperboard Under Machine Conditions,* by Victor Burstein, Institute of Paper Chemistry (by title).

WEDNESDAY, FEBRUARY 26, 1946

9:30 A.M. WATER SESSION (Hotel Biltmore)
Joint Meeting with the American Institute of Chemical Engineers.

LEWIS B. MILLER, W. H. & L. D. Betz, Chairman

1. *Water Quality Requirements for Industry,* by L. B. Miller.
2. *Ground Water,* by Jack B. Graham, U. S. Geological Survey.
3. *White Water Reuse and Disposal,* by H. A. Morrison, Oliver United Filters, Inc.
4. *Ground Water Supply and Its Production,* by W. M. Lewis, Layne-New York Co.
5. *Improvements in the Coagulation of Surface Waters With Activated Silica,* by Lloyd L. Klinger, Consolidated Water Power & Paper Co.
6 *Reclaimer Treatment of White and Waste Waters,* by S. B. Applebaum, The Permutit Co.
7. *Water Quality for Kraft Paper Manufacture,* by L. B. Miller.

(Continued on page 28)

Selection of factory-assembled Limitamp control for this plant made it possible to install a single compact group, instead of a number of separate devices, in a small amount of floor space.

Here's FAST, "PACKAGED" Short-circuit Protection for Your High-voltage Motors... Limitamp Control

LIMITAMP CONTROL

OPERATES WITHIN A SPLIT CYCLE

● You can give your motors sure short-circuit protection by specifying G-E Limitamp control. Faster than any breaker, this "all-in-one-unit" control, with its EJ-2 fuses, clears fault currents in a half cycle.

When a short occurs, the fuses cut off the rise in current in less than a quarter cycle. And the short is cleared long before the current has time to harm the contactors or motor.

GIVE YOUR PAPER MILL THESE IMPORTANT ADVANTAGES

Completely co-ordinated control—Limitamp is "packaged" in a single unit which is easy to install and attractive in appearance.

Full protection—If voltage is low or power fails, the motor is taken off the line. And it will not restart on return of power. Accurately calibrated overload relays protect your motors from overheating due to sustained overloads, locked rotor, or single-phasing.

Years of service—Air-break contactors, good for millions of operations, meet the most severe requirements of high-voltage motor-control service. Contact-tip life is many times that of comparable oil-immersed tips.

Safety for operators—And because it is totally enclosed in an all-metal case, Limitamp control provides protection for all operating personnel.

GENERAL ELECTRIC

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TAPPI ANNUAL MEETING PROGRAM

(Continued from page 26)

9:30 A.M. BYPRODUCTS SESSION (Room B-C)
R. H. STEVENS, National Container Corp., Chairman

1. *Tall Oil from the Consumer's Viewpoint,* by Leonard Byman, Battelle Memorial Inst.
2. *Tall Oil in Printing Ink,* by C. J. VanderValk and Harry Burrell, Heyden Chemical Co.
3. *Industrial Uses of Alkali Lignin,* by E. B. Brookbank, Mead Corp.
4. *Protein Feed from Sulphite Waste Liquors,* by R. D. Walker, Jr., and R. A. Morgen, Engineering and Industrial Experiment Station, University of Florida.
5. *Lignin as a Fertilizer Material,* by Robert S. Aries, Northeast Wood Utilization Council.
6. *A Collector for Sulphate Soap,* by W. P. Thielens and Robert R. Fuller, Gulf States Paper Corp.

9:30 A.M. PLASTICS SESSION (West Ball Room)
D. T. JACKSON, Hammermill Paper Co., Chairman

1. *The Properties of Saran Coating Latex,* by G. W. Stanton and W. A. Henson, Dow Chemical Co.
2. *Resins in the Treatment of Paper,* by William Abramowitz, J. Y. Kao, A. N. Stull, Fred Speyer and Herbert Wells, American Resinous Chemicals Co.
3. *Functional Papers,* by R. H. Mosher and R. S. Bracewell, Marvellum Co.

9:30 A.M. PAPERMAKING SESSION (East Ball Room)
A. E. BACHMANN, Missisquoi Corp., Chairman
Round-table Discussion on Significance of Freeness.

1. *Significance of Freeness,* by James d'A. Clark, Consulting Engineer.

2:00 P.M. PAPERMAKING SESSION (East Ball Room)
A. E. BACHMANN, Missisquoi Corp., Chairman
Round-table Discussion on Water Removal Principles and Equipment Relative to Paperboard Cylinder Machines.

2:00 P.M. PLASTICS SESSION (West Ball Room)

1. *Symposium on Wet Strength,* led by K. M. Britt, Scott Paper Co.
2. *Symposium on Analytical Methods,* led by T. A. Howells, Institute of Paper Chemistry.

2:00 P.M. ENGINEERING SESSION (Room B-C)
W. G. MACNAUGHTON, News Print Service Bureau, Chairman

1. *Use of Leather Belting on Paper Mill Machinery,* by J. Edgar Rhoads, J. E. Rhoads & Sons.
2. *Some Aspects of Pulp Mill Engineering,* by George R. Wadleigh, Consulting Engineer.
3. *Kraft Digester Circulating and Indirect Heating Systems,* by J. M. Wilcox, Electric Steel Foundry Co.
4. *Forced Circulation Boilers,* by W. S. Patterson, Combustion Engineering Co.

2:00 P.M. MECHANICAL PULPING AND PULP PURIFICATION SESSION (Grand Ball Room)
R. M. DRUMMOND, International Paper Co., and D. T. JACKSON, Hammermill Paper Company, Chairmen

1. *Use of Bleached Aspen Semichemical Pulp in Groundwood Book Paper,* by J. N. McGovern, Forest Products Laboratory.
2. *Easily Hydrating Pulp from Poplarwood,* by Karl W. Fries, Rhinelander Paper Co.
3. *Bleaching of Semichemical Pulps from Hardwoods,* by F. A. Simmonds and R. M. Kingsbury, Forest Products Laboratory.
4. *High Density Bleaching of Mechanical Pulp With Hydrogen Peroxide,* by Robert McEwen, Buffalo Electrochemical Co.
5. *Bleaching Aspen Neutral Sulphite Semichemical Pulp With Sodium Peroxide,* by R. T. Mills and F. L. Fennell, Peroxygen Products Div., E. I. du Pont de Nemours & Co. and R. M. Kingsbury and F. A. Simmonds, Forest Products Laboratory.
6. *Peroxide Bleaching of Mechanical Pulps—I. Influence of Bacteria and Enzymes,* by J. S. Reichert, R. T. Mills, and D. J. Campbell, E. I. du Pont de Nemours & Co. (by title).
7. *Peroxide Bleaching of Mechanical Pulps — II. Influence of Bacteria and Enzymes,* by R. T. Mills, W. S. Hinegardner, and W. O. Stauffer, E. I. du Pont de Nemours & Co.
8. *Acid Hydrolysis of Wood Prior to Pulping,* by Emil Heuser, Institute of Paper Chemistry.

THURSDAY, FEBRUARY 28, 1946

9:30 A.M. PACKAGING MATERIALS TESTING SESSION (Grand Ball Room)
W. H. GRAEBNER, Marathon Corp., Chairman

1. *An Isostatic Method for Determining the Gas Permeability of Sheet Materials,* by D. W. Davis, Marathon Corp.
2. *The Use of Paperboard as a Sorptive Material in Protective Packaging,* by R. C. Reitz and L. O. Anderson, Forest Products Laboratory.
3. *Discussion of Testing Methods.*
4. *Laminating Adhesives and Their Applications,* by Arthur Biddle, Reynolds Metals Co. (by title).

9:30 A.M. TESTING METHODS SESSION (Room B-C)
L. V. FORMAN, Inst. of Paper Chemistry, JOHN TONGREN, Hammermill Paper Co., and F. A. BURNINGHAM, Brown Co., Chairmen

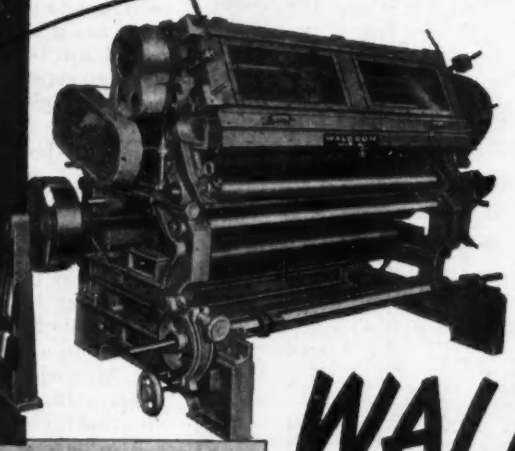
1. *The Rapid Measurement of an Index of Pulp Fiber Length,* by R. de Montigny and P. Zborowski, Rolland Paper Co.
2. *A Simple Method for Predicting the Brightness of Mixed Furnishes,* by W. J. Foote, Consolidated Water Power & Paper Co.
3. *An Ink-Line Test for the Determination of Degree of Sizing,* by R. M. Levy and Milton O. Schur, Ecusta Paper Co.
4. *Mechanism of the Ink Penetration Test,* by William S. Wilson, Monsanto Chemical Co.
5. *Grinding the Beating Surfaces of a Laboratory Beater,* by L. V. Forman and Donald D. Niemeyer, Inst. of Paper Chemistry (by title).

9:30 A.M. GENERAL SESSION (West Ball Room)
L. B. MILLER, W. H. & L. D. Betz, and P. GOODING, Strathmore Paper Co., Chairmen

1. *The Present Status of the Pulp, Paper and Paperboard Industries Stream Improvement*

(Continued on page 44)

PART OF THE PICTURE of famous products



Illustrated: Waldron Horizontal Reverse Roll Coater. Other types include "Micro-Jet", "Synchroset", Knife, Combination Roll and Knife.

WALDRON COATERS

The first coating machine in this country was built by WALDRON in 1852. In every major development in the science of coating since that time, WALDRON engineers have played a prominent part. Today, modern WALDRON machines are designed for a wide variety of coating methods devised to meet individual product and processing problems.

To insure maximum speed, uniformity and quality of coating, the leading makers of coated paper and fabrics specify machines designed and built by WALDRON — machines that embody nearly a century of engineering experience in producing precision coating. Whatever your coating problem, there's a modern WALDRON machine especially designed to correctly meet it.

Utilize the services of our Research and Development Staff and the facilities of our Testing Laboratory to determine in advance your equipment requirements.

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FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending January 19, 1946

STOCKS

	High	Low	Last
A. P. W.	9⅞	8⅛	9⅜
Armstrong Cork Co.	60¾	59¼	59¼
Celotex Corp.	25	23⅜	24⅛
Celotex Corp., pf.	21¼	20¾	21¼
Certain-Teed Products Corp.	16½	15⅝	16⅜
Certain-Teed Products Corp., pf.	...	...	...
Champion Paper & Fibre Co.	51¼	47½	48
Champion Paper & Fibre Co., pf.	114	112	114
Congoleum Nairn Co.	37	35¾	36
Container Corp. of America	40½	39½	40½
Continental-Diamond Fibre Co.	17	15¾	16
Crown-Zellerbach Co.	31¼	29¼	30¼
Crown-Zellerbach Co., pf.	108⅜	107¼	107¼
Dixie Cup Co.	50⅜	47½	47½
Dixie Cup Co.—A	55½	54½	55½
Flintkote Co.	39¾	37¼	37¼
Flintkote Co., pf.	115	112½	115
Robert Gair	10¼	9⅝	10⅛
Robert Gair, pf.	19¾	19⅜	19½
International Paper Co.	47	44	44⅝
International Paper Co., pf.	121	117½	120½
Johns-Manville Corp.	151½	145	145
Johns-Manville Corp., pf.	141½	141½	141½
Kimberly-Clark Corp.	68½	67	67¾
Mac Andrews & Forbes	42	40½	42
Mac Andrews & Forbes, pf.	...	...	...
Masonite Corp.	61¾	59¾	59¾
Mead Corp.	24	21¾	22½
Mead Corp., pf. A—6%	107	104½	107
Mead Corp., pf. B—5½%	107½	106	106¼
National Container Corp.	30¾	27¾	29
Paraffine Companies, Inc.	81½	80	80½
Paraffine Companies, Inc., pf.	...	...	...
Rayonier, Inc.	25¾	23¼	25¾
Rayonier, Inc., pf.	38	37⅝	37⅞
Ruberoid Co.	49	46½	48¾
Scott Paper Co.	57	55	55
Scott Paper Co., pf.	108	108	108
Sutherland Paper Co.	40	39½	39½
Union Bag & Paper Corp.	25¾	24½	24½
United Paperboard Co.	13	12¼	12⅝
U. S. Gypsum Co.	114	111⅜	114
U. S. Gypsum Co., pf.	...	...	...
West Virginia Pulp & Paper Co.	40¼	38	38½
West Virginia Pulp & Paper Co., pf.	112½	112½	112½

BONDS

Abitibi Pulp & Paper Co. 5s '53	106¾	105½	105⅝
Celotex Corp. 3¾s '55	...	...	...
Certain-Teed Products Corp. 5½s '53	...	...	...
Champion Paper & Fibre Co. 3s '65	...	...	...
International Paper Co. 6s '55	107⅝	105⅜	105⅜
International Paper Co. 5s '47	103⅛	103⅛	103⅛
Mead Corp. 3½s '53	...	...	...

New York Curb Exchange

High, Low and Last for Week Ending January 19, 1946

STOCKS

	High	Low	Last
Great Northern Paper Co.	44¾	44½	44½
Hummel-Ross Fibre Corp.	13⅞	13	13¼
St. Regis Paper Co.	11¼	10⅝	10⅞
St. Regis Paper Co., pf.	...	...	...
Taggart Corp.	10¼	9¾	9⅞

BONDS

American Writing Paper Co. 6s '61	106½	102¾	103⅛

Watervliet Elects to Board

KALAMAZOO, Mich., January 17, 1946—The annual meeting of the stockholders of the Watervliet Paper Company was held at the Park-American Hotel on the 16th. Three new members were elected to the board: Severns Balch, Frank A. Lempke of Kalamazoo and William Beverly of Watervliet. They take the places of J. B. Balch, Chester Monroe and R. A. LeRoy, vacated by resignations.

The officers and board as elected are George K. Ferguson, president; Charles B. Hays, vice president; L. B. Anderson, secretary. The officers, the three new members and Fred Scheid, W. C. Hunting and Arno R. Schorer constitute the Board of Directors.

The financial report showed a net profit for 1945 of $199,499 as compared to $187,425 in 1944. Total sales were $3,312,091 an increase of $8,072 over 1944.

The small pulp mill constructed during the year is nearly completed and will be in production February 1. The cost of this unit being $142,268. Changes in the coating and power plants are under way and one machine is being rebuilt.

Abitibi Reorganization Drags On

TORONTO, Ont., January 21, 1946—Bondholders of Abitibi Power and Paper Company, will meet at the Royal York Hotel, Toronto, Ont., on Friday, March 15, for consideration of the Hughes plan of reorganization. It is understood that satisfactory negotiations with the Ontario government have been made in connection with timber licenses for the reorganized company, and it is expected that an announcement in this regard will be made at the bondholders meeting. It had been expected that this meeting of the bondholders would take place in January or February.

Barea Joins C & D; Oliphant Returns

Arnold Barea will join the Castle & Overton, Inc., organization on February 1 as manager of Machinery and Machine Clothing Department. Mr. Barea has been Assistant Superintendent at the Paterson Parchment Paper Company in Bristol, Pa., since 1933 and prior to that was associated with the Brown Company in Berlin, New Hampshire. He started in the paper business with the Smith Paper Company at Lee, Massachusetts, going from there to C. H. Dexter & Sons, Inc., at Windsor Locks and from there to the Brown Company.

Also on Feb. 1st, A. E. Oliphant will return after about two years' service with the Navy.

International Calls Mortgage Bonds

NEW YORK, N. Y., January 15, 1946 — John H. Hinman, president of International Paper Company, announced today that International Paper Company will call for redemption on March 1, 1946, a total of $9,350,500 principal amount of its outstanding Refunding Mortgage 6% bonds representing the bulk of the bonds now outstanding. The bonds are being paid off out of the company's own resources without additional borrowing. The bonds redeemed will be applied toward satisfaction of current and future sinking fund obligations, thus eliminating the need for any further payments into the sinking fund for several years to come. The mortgage is not being discharged at the present time as $200,000 bonds will remain outstanding.

Witham Joins Ciba Company

Starting February 1, 1946, C. L. Witham will be associated with the Southern branch office of Ciba Company, Incorporated, manufacturers and distributors of dyestuffs, as a sales representative. His home will be the Somerville Court Apartments, Mobile, Ala. For the past three years Mr. Witham has been on the staff of the Esso Laboratories of the Standard Oil Company of New Jersey at the Baton Rouge, Louisiana, Refinery and for four years prior to that he was with the Southern Advance Bag and Paper Company, Hodge, La.

General Paper Appoints Coullie

PITTSBURGH, Pa., January 19, 1946—The General Paper & Cordage Company has appointed D. J. Coullie as manager of sales promotion. Mr. Coullie has been associated with the paper industry for twenty-seven years. He has also been active in advertising and graphic arts organizations of the city, and is at present a director of the Pittsburgh Advertising Club, the Industrial Advertising Council, and the Pittsburgh Club of Printing House Craftsmen.

Yesterday's "stop-gap"

today's "must" for paper sizing

MERSIZE

During the war many paper manufacturers became acquainted with Mersize as a most welcome stop-gap for their severely rationed rosin supplies.

But what they learned about Mersize then, they are applying today to making "the best sized papers in the world."

Mersize proved it could double, triple or even quadruple the efficiency of sizing of the paper when added at the beaters.

Mersize produces a whiter paper that yellows less with age. It contains no wax. It is supplied as a paste and is readily dispersible with mechanical agitation in water or in the dilute rosin emulsion. Mersize is stable in storage.

For complete Mersize data and information about a trial in your mill, address: MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston 49, Massachusetts.

Mersize: Reg. U. S. Pat. Off.

MONSANTO CHEMICALS
SERVING INDUSTRY... WHICH SERVES MANKIND

"Paper Week" Resumes Its Program

The American Paper and Pulp Association has issued the tentative program for its annual meeting. All the meetings of the association, together with the allied associations, will be held February 24-March 1 at the Waldorf-Astoria, unless otherwise indicated in the program. The Technical Association of the Pulp and Paper Industry will meet at the Commodore and its program is printed on page 27 of this week's issue of the PAPER TRADE JOURNAL.

The annual luncheon will be held in the Grand Ball Room of the Waldorf-Astoria on February 20.

Sunday, February 24, 1946

THE TISSUE ASSOCIATION, INC.

10:00 A.M. Toilet Tissue Division—4-M.
2:00 P.M. Paper Towel Division—4-M.
4:00 P.M. Wrapping and Waxing Tissue Division —4-J-K.
5:00 P.M. Jumbo Roll Division—4-J-K.
6:00 P.M. Nominating Committee—4-L.
7:00 P.M. Board of Governors Dinner—Carpenter Suite.

UNITED STATES PULP PRODUCERS ASSOCIATION

10:00 A.M.-3:00 P.M. Annual Meeting — Jansen Suite.
1:15 P.M. Annual Luncheon—Jansen Suite.

Monday, February 25, 1946

AMERICAN PAPER AND PULP ASSOCIATION

8:30 A.M. Finance Committee, Breakfast—Carpenter Suite.
10:00 A.M. Industrial Relations—A.P.P.A. Office.
10:00 A.M. Emergency Pulpwood Committee — 4-J-K.
2:30 P.M. Public Relations Committee—4-J-K.
2:30 P.M. Committee on Biological Control — 4-N-P.
3:30 P.M. Forestry Committee—Crane Room V.

BLOTTING PAPER MANUFACTURERS ASSOCIATION

2:00 P.M. Annual Meeting—Crane Room U.

COATED AND PROCESSED PAPER ASSOCIATION

10:00 A.M. Annual Meeting — Club Suite, Hotel Commodore.
12:30 P.M. Industry Luncheon—Club Suite, Hotel Commodore.

NATIONAL COUNCIL FOR STREAM IMPROVEMENT, INC.

10:00 A.M. Joint Meeting—Regional Chairmen and Vice Chairmen and Technical Planning and Budget Committees—Carpenter Salon.

SALESMEN'S ASSOCIATION OF THE PAPER INDUSTRY

3:30 P.M. Executive Committee Meeting—Carpenter Suite.
4:30 P.M. Annual Meeting and Cocktail Party—Palm Room.

SULPHITE PAPER MANUFACTURERS ASSOCIATION

10:00 A.M. Budget Committee—Crane Room V.
11:00 A.M. Board of Governors—Crane Room V.
2:30 P.M. Annual Meeting—Jansen Suite.
6:00 P.M. Annual Dinner—Jansen Suite.

THE TISSUE ASSOCIATION, INC.

10:00 A.M. General Tissue Industry Meeting—Jansen Suite.
4:00 P.M. New Board of Governors — Le Perroquet W.

WRITING PAPER MANUFACTURERS ASSOCIATION

10:00 A.M. Executive Committee—Pillement Suite.
2:30 P.M. Bristol Board Group—Carpenter Suite.

Tuesday, February 26, 1946

AMERICAN PAPER AND PULP ASSOCIATION

10:00 A.M. Committee on Industrial Relations — 4-J-K.
10:00 A.M. Committee on Public Affairs — 4-U (Crane).
10:00 A.M. Statistical and Cost Engineering Committee—4-L.
10:00 A.M. Technical Committee—Crane V.
2:30 P.M. Committee on Classification and Definitions—Crane V.
2:30 P.M. Committee on Coordination of Research —4-L.
3:00 P.M. Pulp and Paper Industry Council to Department of Commerce—Crane U.

ASSOCIATION OF PULP CONSUMERS, INC.

1:00 P.M. Director's Luncheon—Le Perroquet Y.
3:00 P.M. Annual Meeting—Le Perroquet X.

GROUNDWOOD PAPER MANUFACTURERS ASSOCIATION

10:00 A.M. Annual Meeting—Carpenter Suite.
1:00 P.M. Luncheon—Carpenter Suite.
2:30 P.M. Annual Meeting (continued)—Carpenter Suite.

KRAFT PAPER ASSOCIATION, INC.

10:00 A.M. Executive Committee—Pillement Suite.
1:00 P.M. Executive Committee Luncheon—Pillement Suite.

NATIONAL COUNCIL FOR STREAM IMPROVEMENT, INC.

10:00 A.M. Board of Governors—Carpenter Suite.
2:30 P.M. Meeting of Members—Jansen Suite.
4:30 P.M. New Board of Governors—Jansen Suite.

PAPER NAPKIN ASSOCIATION, INC.

2:00 P.M. Hotel Barclay.

SULPHITE PAPER MANUFACTURERS ASSOCIATION, INC.

9:30 A.M. Bleached Group—4-N-P.
11:00 A.M. Machine Glazed Wrapping Group — —4-N-P.
2:30 P.M. Unbleached Group—4-N-P.
3:30 P.M. Manila Group—4-N-P.

THE TISSUE ASSOCIATION, INC.

10:00 A.M. O.P.A. Tissue Industry Advisory Committee—4-M.
2:30 P.M. O.P.A. Tissue Industry Advisory Committee (continued)—4-M.

WRITING PAPER MANUFACTURERS ASSOCIATION

9:30 A.M. 85th Annual Meeting—Jansen Suite.
7:00 P.M. 85th Anniversary Dinner — St. Regis Hotel.

WAXED PAPER INSTITUTE, INC.

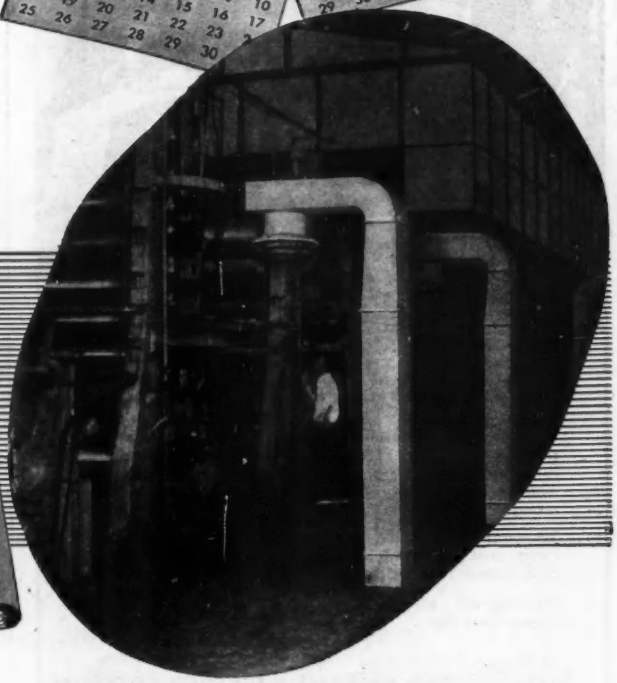
Hotel Pennsylvania.

(Continued on page 34)

Just ahead...

The Season when you'll feel the need for

ROSS Summer Ventilation



This simple and effective spot cooling system is fast becoming standard equipment for all mills.

Quickly and easily installed, it assures comfort for operators and cuts usual loss of time resulting from heat sickness and fatigue. Installed in the working areas of the mill, this system provides ideal spot cooling with results that cannot be secured by supplying or exhausting air at the roof. Ross Summer Ventilation is proving particularly popular in working aisles in front of dryers and around the cylinders or wire and calenders. For 1946 summer operation, orders must be placed promptly. Ask us to send you full particulars.

ROSS SYSTEMS

J.O.ROSS ENGINEERING CORP.

DESIGNERS AND BUILDERS OF AIR PROCESSING SYSTEMS

350 MADISON AVE., NEW YORK 17, N. Y.

ROSS CONTROL OF AIR FOR MODERN INDUSTRY SYSTEMS

201 N. Wells St., Chicago-6 • 79 Milk St., Boston-9 • 12953 Greeley Ave., Detroit-3 • 1709 W. Eighth St., Los Angeles-14

ROSS ENGINEERING OF CANADA, LIMITED — Dominion Square Building, MONTREAL, P. Q.

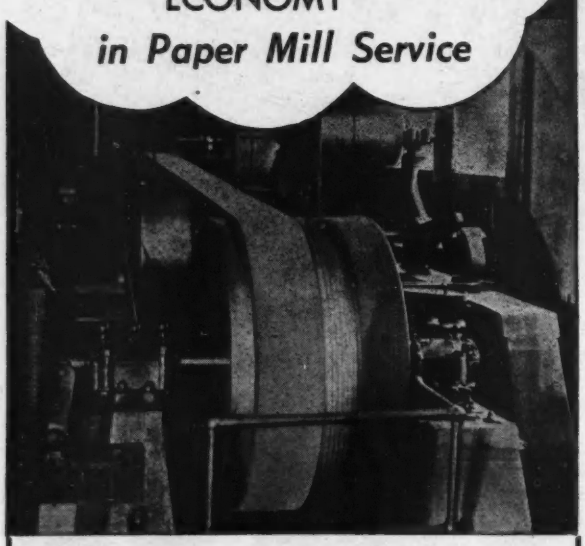
CARRIER—ROSS ENGINEERING COMPANY, LIMITED, LONDON, ENGLAND

TANNATE WATERSHED

. . . the Belt that proves its

ECONOMY

in Paper Mill Service



TANNATE LEATHER BELTING replacing rubber belts on a horizontal cone drive for calender stack, in 7½ years saved one mill over $4000 in belt costs and elimination of shutdowns.

The warm, humid conditions of a paper mill are a severe test of any belt. TANNATE LEATHER BELTING is cemented with waterproof cement and treated to resist moisture so that laps and plies will not separate. It is also resistant to machine oils and many weak chemicals.

Even when damp, TANNATE carries nearly a full load. Its exceptional pulley grip and great strength gets consistently high output from machines with little maintenance.

For long-life, high efficiency and low upkeep—for all around Economy . . . equip with TANNATE.

for LONGER BELT LIFE, LOWERED COSTS

Equip with RHOADS

Tannate

WATERSHED

LEATHER BELTING

—Established 1702—

J. E. RHOADS & SONS

35 N. SIXTH ST., PHILADELPHIA 6, PA.

NEW YORK • CHICAGO • ATLANTA

PAPER WEEK RESUMES

(Continued from page 32)

Wednesday, February 27, 1946

AMERICAN PAPER AND PULP ASSOCIATION

10:00 A.M. Executive Committee and Board of Governors—Jansen Suite.
10:00 A.M. Waste Paper Committee—4-J.
1:00 P.M. Industry Luncheon—Grand Ball Room.
3:00 P.M. Committee on Instrumentation Research —Crane U.
3:00 P.M. Committee on Waste Utiilzation—Crane V.
6:30 P.M. President's Dinner—Carpenter Suite.

AMERICAN PULPWOOD ASSOCIATION

9:30 A.M. Annual Meeting—Le Perroquet X.
2:00 P.M. Annual Meeting (continued)—Le Perroquet X.
7:00 P.M. Dinner—Jansen Suite.

GLASSINE AND GREASEPROOF MANUFACTURERS ASSOCIATION

4:00 P.M. Executive Committee — T. J. Burke's Suite.

KRAFT PAPER ASSOCIATION, INC.

2:30 P.M. Annual Meeting (following APPA Luncheon)—Le Perroquet Y.

NEWSPRINT MANUFACTURERS ASSOCIATION OF TSE U. S., INC.

10:00 A.M. Annual Meeting—Crane U.

SULPHITE PAPER MANUFACTURERS ASSOCIATION, INC.

10:00 A.M. Bleached Kraft Specialties Group—4-J.

THE' TISSUE ASSOCIATION, INC.

10:00 A.M. Gift Wrapping Tissue Division — Le Perroquet W.
2:30 P.M. Sanitary Absorbent Tissue Division—Le Perroquet W.

WRITING PAPER MANUFACTURERS ASSOCIATION

10:00 A.M. Cover Paper Group—Carpenter Salon.
1:00 P.M. Thin Paper Group—Carpenter Salon.

Thursday, February 28, 1946

AMERICAN PULPWOOD ASSOCIATION

10:00 A.M. American Pulpwood Association Directors' Meeting—Jansen Suite.

FOREST INDUSTRIES COUNCIL

2:00 P.M. Forest Industries Council Meeting — Jansen Suite.

GLASSINE AND GREASEPROOF MANUFACTURERS ASSOCIATION

10:00 A.M. Annual Meeting—Pillement Suite.
1:00 P.M. Luncheon—Pillement Suite.
3:00 P.M. Technical Committee—4-M.

FOREST INDUSTRIES INFORMATION COMMITTEE

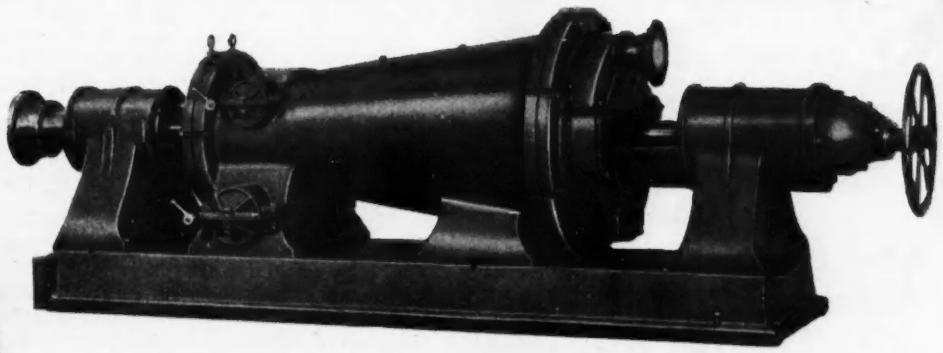
10:00 A.M. Meeting—State Chairmen—Forest Indus. Inf. Com.—4-M.

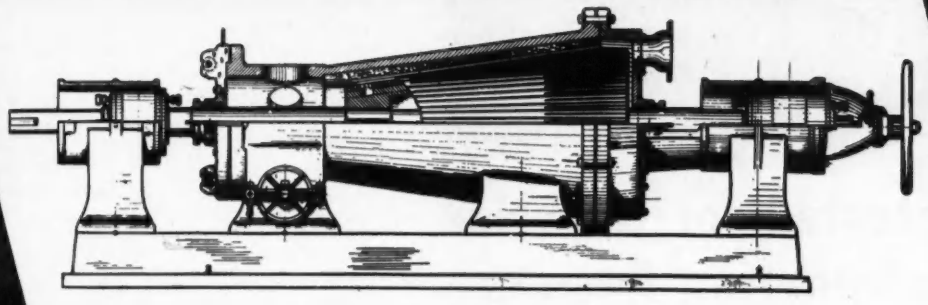
Friday, March 1, 1946

GLASSINE AND GREASEPROOF MANUFACTURERS ASSOCIATION

10:00 A.M. Technical Committee (continued)—Pillement Suite.
1:00 P.M. Technical Committee Luncheon—Pillement Suite.

THE JONES JORDAN

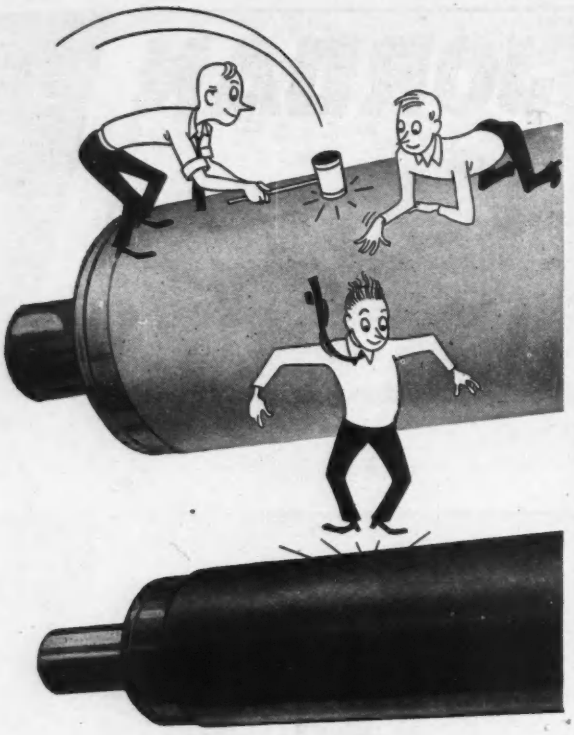




The modern Jones Jordan embodies highly engineered improvements that provide extreme accuracy of vital parts, thrust mechanism, and also carefully applied filling design to meet specific mill requirements. The proper application of filling permits either effective cutting action, or positive, efficient DEFIBERING, FIBRILLATING, OR HYDRATING, as desired.

Jones

E.D. JONES & SONS COMPANY-PITTSFIELD, MASS.
Builders of Quality Machinery for Paper Mills



Pretested for Superior Calendering Results

When you buy Butterworth Calender Rolls, you buy Rolls that have been made to specification and tested for hardness, smoothness and density before delivery. Tests are made in series with as many as 120 test readings before a Roll is pronounced satisfactory.

With Butterworth Calender Rolls you get superior calendering results at low cost. Adequate resiliency on the face of the Rolls assures a finish soft enough to allow high speed printing. Remember, the finish on paper can only be as good as the Rolls in the calender.

We furnish new Rolls or will refill your present Rolls.

• • •

For full information, write or call H. W. Butterworth & Sons Company, Philadelphia 25, Pa. — Textile Finishing Machinery Company Division, Providence, R. I. : : Charlotte, N. C., 1211 Johnston Bldg. : : In Canada — W. J. Westaway Co., Hamilton, Ont.

Butterworth CALENDER ROLLS

Waxed Paper Men Pick New York

The annual meeting of the waxed paper industry will be held at the Hotel Pennsylvania, New York City, February 28, 1946, it was announced by A. H. Noelke, Secretary and Treasurer of the Waxed Paper Institute, Inc. All manufacturers of waxed paper are expected to be represented. In conjunction with this meeting, the Executive Committee of the Waxed Paper Institute will convene on February 27 to formulate policies for the fiscal year 1946-47, and to review activities of the previous year. V. H. Wilshire, President of Specialty Papers Company, Dayton, Ohio, will preside at this meeting, and at the general meeting the following day.

Highlighting the February 28 session will be a report by R. A. Nash, Manager of Bakery Division of the Marathon Corporation, Menasha, Wis., and Chairman of the Merchandising Committee, on the Institute's National Merchandising Program. This program of industry-wide promotion was inaugurated in 1945. Promotional plans for 1946 will also be discussed and presented at this meeting.

P. J. Massey, H. P. Smith Paper Co., Chicago, Chairman of the Institute's Industrial Relations Committee, will make a progress report on that committee's activities and present a survey on the status of the industry's labor situation.

The possibility of increased prices of raw paper stock, which would directly affect all manufacturers of waxed paper, will be discussed by R. C. McCaskey, Minerva Wax Paper Co., Minerva, Ohio, who is Chairman of the OPA Waxed Paper Industry Advisory Committee.

The statistical reporting system, adopted by the industry during 1945, will be reviewed by A. F. Kletzien, Commercial Research Department, Marathon Corporation, Menasha, who is Chairman of the Institute's Statistical Committee.

George C. Wieman, Western Waxed Paper Co., Los Angeles, Cal., Chairman of the Committee on Membership Dues, will make a report containing recommendations for the establishment of a new basis for dues payments, applicable to all converters of waxed paper.

TAPPI ANNUAL MEETING

(Continued from page 28)

Program, by Russell L. Winget, National Council for Stream Improvement.

2. *Accelerated Stream Recovery by Mechanical Reaeration,* by Harry W. Gehm, National Council for Stream Improvement.
3. *An Effective Bleach Handling System for Rag Half Stock Bleaching,* by L. A. Moss, Whiting Plover Paper Co.
4. *Film Properties and Utilization of Resin-Starch,* by C. C. Kesler, J. E. Killinger and E. T. Hjermstad, Penick & Ford, Ltd.
5. *The Effect of Starch on the Sizing and Strength Properties of Paper,* by Elmer K. Stilbert and C. E. Libby, New York State College of Forestry.

1:00 P.M. ANNUAL LUNCHEON (Grand Ball Room)

VANCE P. EDWARDES, Presiding

1. Introduction of Guests.
2. Speaker—To be announced.
3. *Medal Presentation* to William G. MacNaughton, by Lt. Col. James d'A. Clark.

The pulp and paper industry hasn't seen much Calgon during the past four years, but now that it is available for new as well as old customers you too can obtain Calgon.

Get acquainted with this unique product and learn for yourself the ways in which it helps in various paper manufacturing processes.

Take paper coating for example. Calgon is an excellent dispersing agent for any of the pigments used in coating paper. It improves the homogeneity and the spreading qualities of the coating mix, whether starch or casein is used as the adhesive.

Then too when added to the water supply in amounts as small as 2 p.p.m. Calgon will inhibit the deposition of scale in lines and equipment. This same treatment will control iron or manganese in the water. Corrosion of pipe lines is inhibited.

The addition of Calgon to the heater in proportions as low as 10 p.p.m. will aid in improving the sizing of the finished paper.

These benefits of Calgon are facts—borne out by the experience of the mills where use of Calgon is standard practice. A letter will bring you full information about Calgon.

It's time to get acquainted with Calgon*

*T. M. Reg. U. S. Pat. Off.

HAGAN HALL BUROMIN CALGON

calgon, inc.

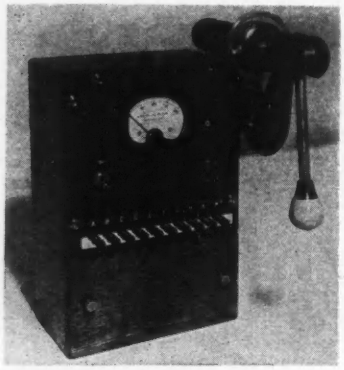
A SUBSIDIARY OF HAGAN CORPORATION

HAGAN BUILDING PITTSBURGH 30, PA.

Static Suppressor on Hart Moisture Meter

(An error which last week substituted one word for another in a news story of an improvement that has been made by Hart Moisture Meters, gave a completely erroneous impression of the effect of the improvement. The improvement is a device that suppresses static—Ed)

A recent development which will add to the usefulness of Hart Moisture Meters in mills where severe static conditions sometimes prevail, is an arrangement assembled as part of the contactor which completely isolates from all external electrical influence, the portion of the sample involved in the test. This results in a perfectly steady needle so that the instrument may be employed immediately beside



HART MOISTURE METER

a running web of paper, or even of dry felt, and will perform with complete satisfaction even in the presence of severe static. This device is not necessary in all mills but it has been found highly desirable especially in the northern part of the country and Canada, according to Hart Moisture Meters, Grand Central Terminal, New York, 17.

SEEK CLOSE COORDINATION

(Continued from page 11)

Hartford Accident and Indemnity Company. Consolidated's mechanical crew also was praised during the award meeting at the Elks Club, Wisconsin Rapids.

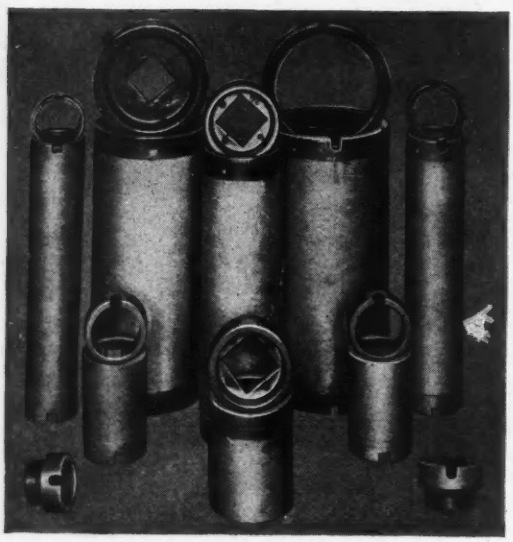
Former Claims Manager J. J. Plzak, now a member of the sales department, Plastics division, recalled incidents of his association with the drivers, and C. E. Jackson, mill manager also praised the group.

The drivers receiving the awards were Ed Saeger, Fred Giese, George Lundquist, John Henke and Walter Panzer, 10 years of safe driving; Gerard Kaudy, 8 years; Verne Hansen, 4 years, and Ed Knuth, 2 years.

Mill Credit Unions Meet

Credit unions serving employes of various paper mills held their annual meetings last week. Presidents of the various groups are as follows:

Bull's-Eye Credit Union, serving workers of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Lawrence Villeneuve. Lakeview Credit Union, Kimberly-Clark, Neenah, Robert Corey. Banta Credit Union of the George Banta Publishing Company, Menasha, William Zinke. Neenah Paper Company Credit Union, Neenah, George Seitz. Thilmany Credit Union, Thilmany Pulp and Paper Company, Kaukauna, W. C. Hess.



ELIXMAN

CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

CORES

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.

CORINTH, N. Y.

The BROUGHTON S-13 Oscillating Shower

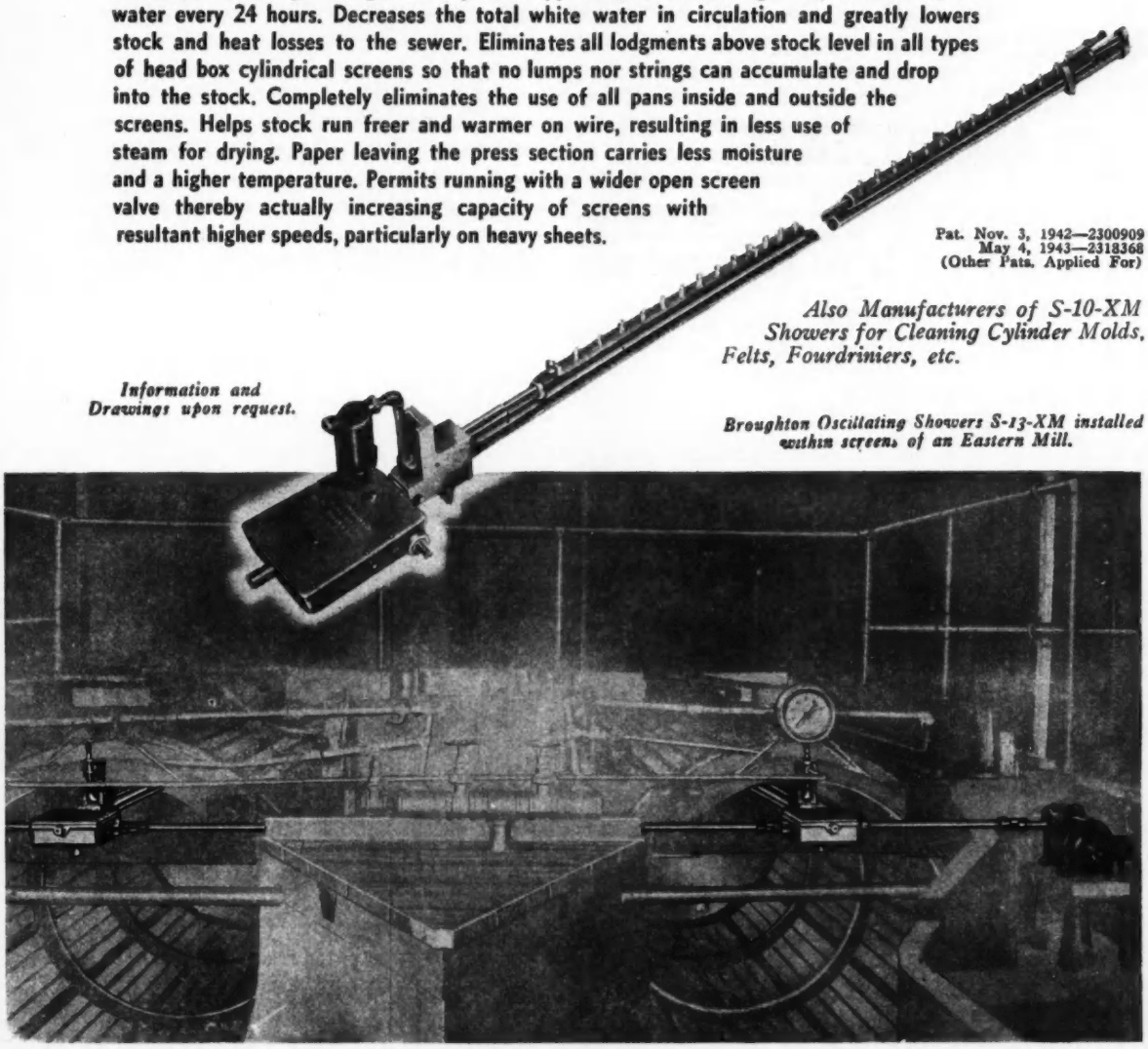
effects large savings in water... steam... and operating efficiency of Rotary Screens

Requires less than 5 gallons per minute of fresh, filtered water to do a thorough job of continuous cleaning. Savings in many mills approximate 100,000 gallons, and more, of water every 24 hours. Decreases the total white water in circulation and greatly lowers stock and heat losses to the sewer. Eliminates all lodgments above stock level in all types of head box cylindrical screens so that no lumps nor strings can accumulate and drop into the stock. Completely eliminates the use of all pans inside and outside the screens. Helps stock run freer and warmer on wire, resulting in less use of steam for drying. Paper leaving the press section carries less moisture and a higher temperature. Permits running with a wider open screen valve thereby actually increasing capacity of screens with resultant higher speeds, particularly on heavy sheets.

Pat. Nov. 3, 1942—2300909
May 4, 1943—2318368
(Other Pats. Applied For)

Also Manufacturers of S-10-XM Showers for Cleaning Cylinder Molds, Felts, Fourdriniers, etc.

Information and Drawings upon request.



Broughton Oscillating Showers S-13-XM installed within screens of an Eastern Mill.

A. E. BROUGHTON & COMPANY

Manufacturers of mechanically operated Oscillating Showers, and Unit Vacuum Controls for paper machine suction boxes.

GLENS FALLS, N. Y.

Blank Book Elects

HOLYOKE, Mass., January 21, 1946 —Frank B. Towne, for 58 years treasurer of the National Blank Book company, has resigned and the directors of the National have promoted his son, Richard P. Towne from the post of assistant treasurer to the treasurership.

Another important change in the management was made by the board of directors at their meeting when they elected Joseph M. Towne, president to succeed his brother Edward S. Towne, who has been president of the company since 1917. The latter is taking over the vice-presidency, left vacant by the elevation of Joseph M. Towne.

Messrs Frank B. Towne and Edwards S. Towne are in ill health. Both were given a unanimous vote of appreciation for their long years of fine service.

Alton B. Hughes of South Hadley was elected assistant treasurer to succeed Richard P. Towne. He is controller of the company.

Hubert S. Towne, vice-president of Van Strum & Towne, Inc., New York, who has been in the army and who is now in charge of the Chicago office of that firm, was reelected to the board of directors. The other directors are: Charles F. Robbins, president of the A. G. Spalding Bros., Inc.; John G. Baker, president of Ohio university; Joseph M. Towne, Richard O. Towne, Edward S. Towne, Richard M. Weiser, superintendent; Paul Buckwalter, sales manager and Clifford S. Lyon, sec.

Eagle A Promotes McNaugh

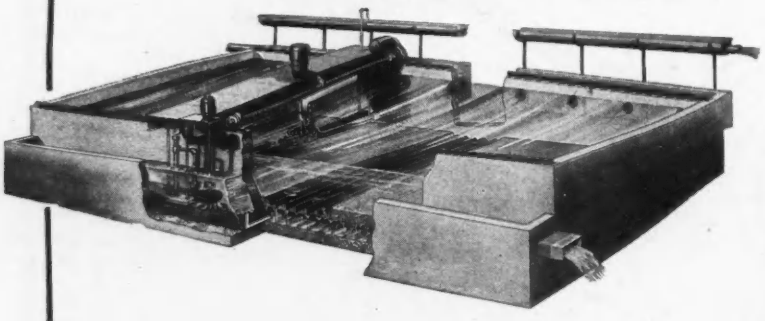
HOLYOKE, Mass., January 21, 1946 —John G. McNaught, well known salesman for American Writing Paper Corp., has been appointed division sales manager, supervising sales of all Eagle-A brands and other mercantile papers. McNaught has been connected with the sales department of Eagle-A for many years. He served as salesman in the New York office prior to going to Holyoke to assume the duties of sales office manager.

The complete Eagle-A sales department executive personnel consists of:—

James H. Sweet, vice-president, sales and advertising; John G. McNaught, division sales manager, supervision sales of mercantile papers; Frederick A. Curtis, division sales manager, supervising sales of technical and industrial papers.

AN ANNOUNCEMENT

of unusual interest to the paper and pulp industry



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Developed since 1940 by W. C. Laughlin, this remarkable unit has already proved its worth to the paper industry in handling paper mill waste water or excess white water. Fibre and filler are recovered and reused, while water is sufficiently free of suspended matter for reuse on showers. The automatic cleaning or backwash mechanism is motor-driven, operating length of the filter bed.

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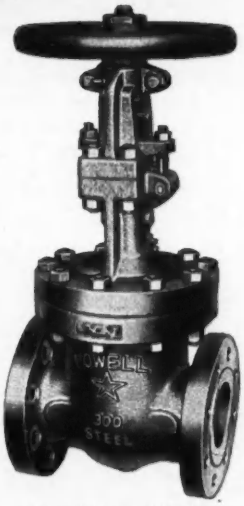

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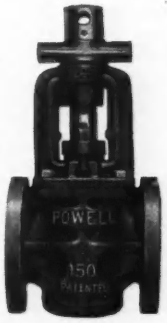

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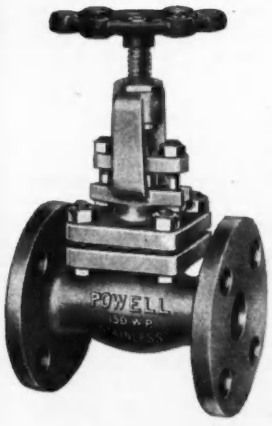

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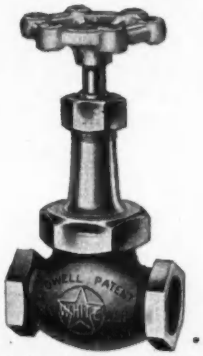
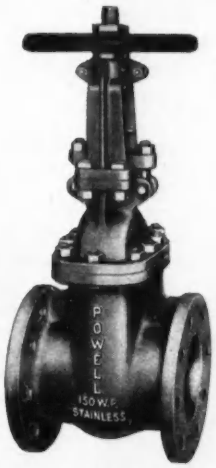


200-pound Bronze Globe Valve with renewable seat and regrindable, renewable, wear-resisting semi-cone plug type disc.



150-pound Stainless Steel O. S. & Y. Gate Valve.

200-pound Bronze Gate Valve with renewable, wear-resisting taper wedge disc.

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POWELL VALVES

PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
W. L. Cook, Editor

PAPER OUTPUT NEAR RECORD

Paper and paperboard production in 1945 aggregated 17,374,208 tons, with mills operating at an average ratio of 90.3% of estimated capacity. This is the highest output of paper since an all-time record was established in 1941. The output of paperboard in 1945 was 56,940 tons lower than in 1944. Paper production in 1945, all types, totaled 8,468,580 tons or 89.7% of capacity, while production of all types of paperboard was 8,905,628 tons or 93% of capacity.

In comparing 1945 with preceding years it is evident that the United States paper industry has achieved a notably high average for the year, despite numerous difficulties. The comparison of paper output with former years is as follows: 1944, 8,220,236 tons, 88.1% of capacity; 1943, 7,035,688 tons, 87.8% of capacity; 1942, 9,114,678 tons, 90.4% of capacity, and in 1941, the record year, 9,362,405 tons at 97.4% of capacity. The comparative production in paperboard is as follows: 1944, 8,962,568 tons, 93% of capacity; 1943, 8,620,434 tons, 94% of capacity; 1942, 7,969,184 tons, 91% of capacity, and 1941, 8,399,960 tons at 98% of capacity.

The 1945 production of newsprint at 725,267 tons, compares with 720,752 tons in 1944, with 811,309 tons in 1943, with 967,211 tons in 1942, with 1,043,999 tons in 1941, and with 1,056,304 tons in 1940. This decline, the report states, reflects the withdrawal of domestic mills from the manufacture of newsprint paper. Groundwood printing and specialty paper production in 1945 was 636,506 tons, compared with 593,094 tons in 1944, with 585,673 tons in 1943; with 610,168 tons in 1942, and with 642,676 in 1941. Book paper output was 1,494,436 tons, compared with 1,435,785 tons in 1944, with 1,592,878 tons in 1943, with 1,885,000 tons in 1942, and with 2,025,891 tons in 1941.

Writing paper production in 1945 was 755,804 tons, compared with 726,557 tons in 1944, with 767,310 tons in 1943, with 853,468 tons in 1942, and with 738,434 tons in 1941. Production of wrapping paper was 854,771 tons, compared with 789,084 tons in 1944, and with 831,758 tons in 1943. A substantial increase occurred in coarse wrapping, converting and bag paper at 1,981,377 tons, compared with 1,922,329 tons in 1944, and with 1,946,908 tons in 1943.

Declining production was reported in various types of paper which were increased to meet essential war requirements. The output of glassine, however, was higher at 84,600 tons, compared with 82,713 tons in 1944, and with 83,650 tons in 1943. Greaseproof paper production totaled 22,931 tons, compared with 32,247 tons in 1944, and with 27,380 tons in 1943; vegetable parchment, 32,568 tons, compared with 32,247 tons in 1944, and with 33,294 tons in 1943; while the output of other wrapping was 714,672 tons, compared with 649,718 tons in 1944, and with 687,434 tons in 1943. Bag paper reduction was lower at 366,070 tons, compared with 375,167 tons in 1944, and with 518,114 tons in 1943; while converting paper was higher at 760,536 tons, compared with 758,078 tons in 1944, and with 597,036 tons in 1943.

Multi-wall sack paper, which has been steadily increasing. was higher at 423,823 tons, compared with 391,702 tons in 1944, and with 315,469 tons in 1943; while special industrial paper was lower at 237,521 tons, compared with 245,416 tons in 1944, and with 207,662 tons in 1943. The output of sanitary paper rose to 823,889 tons, compared with 807,893 tons in 1944, and with 806,023 tons in 1943. Production of tissue paper was slightly lower at 157,384 tons, compared with 157,540 tons in 1944, and with 162,766 tons in 1943. Production of absorbent paper declined at 88,849 tons, compared with 90,107 tons in 1944, and with 88,254 tons in 1943; while building paper output was 889,464 tons, compared with 881,246 tons in 1944, and with 877,582 tons in 1943.

In the several types of paperboard, containerboard output was lower at 4,130,424 tons, compared with 4,228,304 tons in 1944, and with 4,087,972 tons in 1943; while the output of folding boxboard was higher at 2,266,861 tons, compared with 2,116,152 tons in 1944, and with 2,047,238 tons in 1943. Building board was also higher at 1,121,824 tons, compared with 1,087,467 tons in 1944, and with 1,063,851 tons in 1943. The output of setup boxboard was 718,972 tons, compared with 750,313 tons in 1944, and with 829,102 tons in 1943; cardboard, 69,924 tons, compared with 69,709 tons in 1944, and with 63,757 tons in 1943; miscellaneous board, 597,623 tons, compared with 710,623 tons in 1944, and with 528,514 tons in 1943, and tube stock, 361,034 tons, compared with 458,107 tons in 1944, and with 307,308 tons in 1943.

Calendar of Coming Events

February 25-28, 1946.—American Paper and Pulp Association, Annual Convention, Waldorf Astoria Hotel, New York.

February 25-28, 1946.—Technical Association of the Pulp and Paper Industry, Annual Convention, Commodore Hotel, New York.

February 28, 1946.—Waxed Paper Institute, Annual Meeting, Hotel Pennsylvania, New York.

April 1-3, 1946.—National Paper Trade Association, Annual Convention, Waldorf Astoria Hotel, New York.

June 17-20, 1946.—American Pulp and Paper Mill Superintendents Association, Annual Convention, Poland Spring, Me.

Chemical Show Opens Feb. 25

The twentieth Exposition of Chemical Industries will be held at Grand Central Palace, New York, February 25-March 2, inclusive. One of the prime services provided by the exposition is to show the current post-war alignment in respect to materials, processing equipment and research facilities, especially with reference to the technical support which they may be able to provide in the development of new products and even whole new industries.

As in former years, the pulp and paper industry will be directly served by the exhibits. One of the wartime developments was the use of microcrystalline waxes on a large scale. Now, with production capacity more than doubled, many new peacetime uses for them in paper making and other industries are projected. New development in resins for use in the paper industry and many other wartime developments of great importance to the industry will be shown.

The general forecast of the show this vear indicates representation in practically all the categories of previous expositions. The exposition is under the management of the International Exposition Company, Grand Central Palace, New York 17, N. Y., of which Charles F. Roth is president.

Polytechnic Opens Registration Lists

Registration for the second semester of the graduate session and the evening undergraduate session of the Polytechnic Institute of Brooklyn will open Monday, January 28, and will continue through the week. In announcing the registration for these sessions, Dr. Erich Hausmann, dean of the college, said that registration for the undergraduate day session has been so heavy that it was closed as of January 1. At the present time registration for the undergraduate day session is being accepted for the fall term starting in September, 1946. All told, 330 new students, of whom 165 are freshmen, will enter the Polytechnic in the undergraduate day session starting February 4.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1945		Corresponding Weeks—1944	
Dec. 8	99.0	Dec. 9	93.7
Dec. 15	99.0	Dec. 16	89.3
Dec. 22	96.5	Dec. 23	84.6
Dec. 29	60.8	Dec. 30	62.0
Jan. 5,'46	89.1	Jan. 6,'45	81.0
Jan. 12	*96.0*	Jan. 13	88.7

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1944	88.7	88.5	88.1	87.6	88.7	89.8	80.3	90.6	88.2	92.5	90.6	92.4	88.1
1945	86.7	89.4	90.2	88.1	89.8	91.2	80.8	88.6	90.2	95.9	95.5	*91.0*	89.7

COMPARATIVE YEARLY SUMMARIES

	1938	1939	1940	1941	1942	1943	1944	1945
Year Average	71.5	*83.4*	85.6	97.4	90.4	87.8	88.1	*89.7*

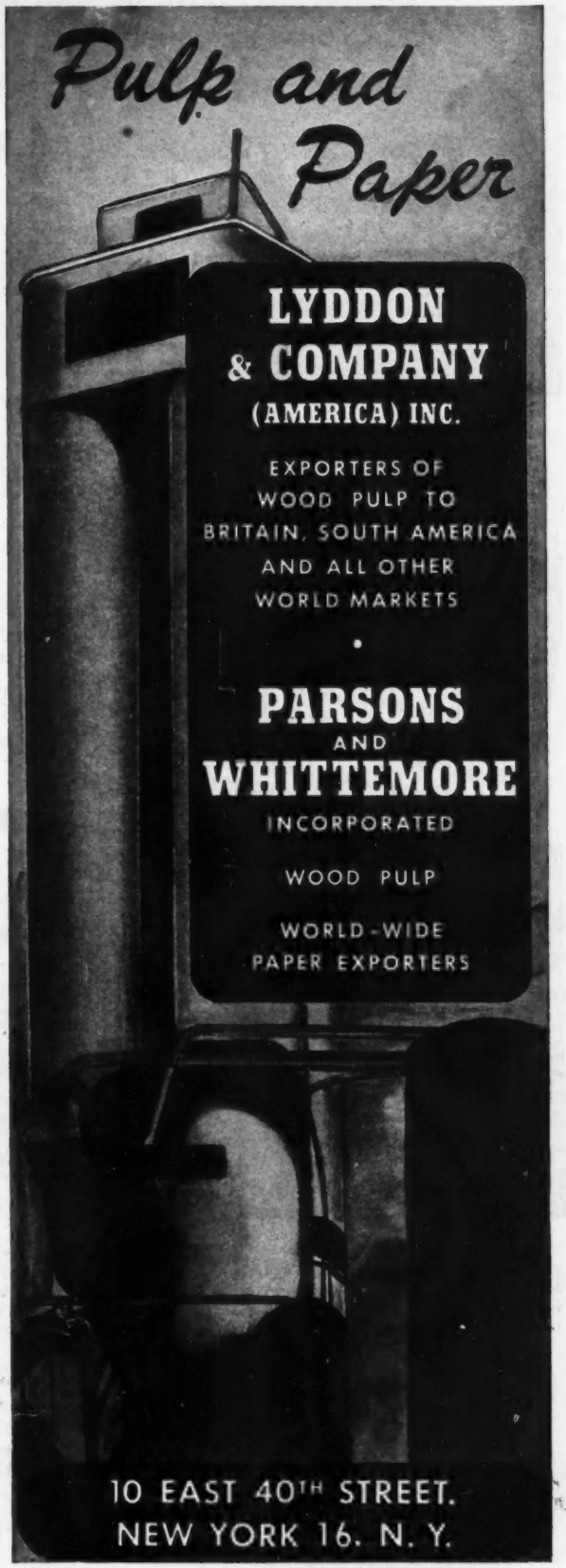
* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Current Weeks—1945		Corresponding Weeks—1944	
Dec. 8	97	Dec. 9	95
Dec. 15	98	Dec. 16	94
Dec. 22	92	Dec. 23	94
Dec. 29	52	Dec. 30	57
Jan. 5,'46	75	Jan. 6,'45	80
Jan. 12	*94*	Jan. 13	95

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1944	90	96	95	96	96	96	85	96	92	95	95	85	93
1945	91	95	97	97	96	96	86	90	91	97	95	*85*	93

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.



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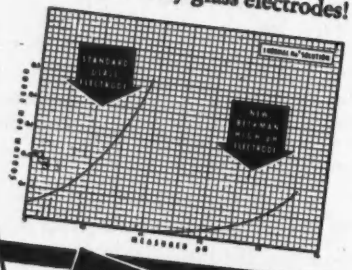
Q. *There is only ONE make of modern pH equipment with which accurate pH measurements can be made in highly alkaline solutions, even in the presence of sodium ions. Do you know what that make is?*

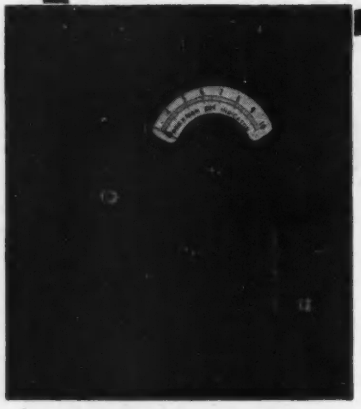
A. Beckman pH equipment—and *only* Beckman equipment! Note in chart the accuracy of Beckman Type E Glass Electrode in highly alkaline solutions compared with ordinary glass electrodes!



Q. *There is only ONE make of pH equipment with which glass electrode pH measurements can be made in boiling hot process solutions. Do you know the name of this equipment?*

A. Again Beckman—and *only* Beckman! With Beckman High Temperature Glass Electrodes, continuous pH measurements can be made in solutions as hot as 100°C (212°F). This feature is highly important to consider in the purchase of pH equipment for *any* purpose. Even though your present operations may not involve hot solutions, you never know when changes or additions to your operations may obsolete equipment not providing this feature. Buy Beckman to begin with *and be sure!*

There's a Beckman pH instrument for your requirement.



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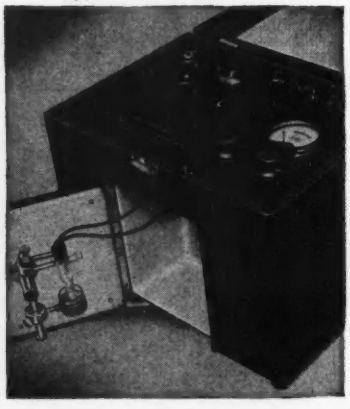

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122 E. 42nd St., New York 17, N. Y.
Edited by R. G. Macdonald, Secretary

The Importance of Hemicellulose in Wood Pulp

By Rex Vincent[1]

Abstract

The chemistry of hemicellulose and its relationship with the other constituents which comprise wood is discussed. The commercial pulping procedures remove much of the hemicellulose from the pulp although it is indicated that its presence aids hydration of the pulp during stock preparation. Recently a process has been developed by which lignin is removed without affecting the other carbohydrates present and since the holocellulose so obtained contains hemicellulose, it is to be expected that new pulps will be produced.

Nearly everyone in the paper and pulp industry knows that each tree cut down for conversion into wood pulp is basically composed of only three materials . . . cellulose, lignin, and other carbohydrates. There is not much confusion about the cellulose because, after all, the pulp itself, or the paper, is cellulose and can be seen, felt, and, in a way, understood. It is fibrous, it is usually white (excepting kraft pulp) and it possesses physical properties that are relatively simple to measure. Its chemical properties have been practically disregarded by the paper industry, but the phenomenal growth of rayon, both viscose and acetate, has developed an awareness that cellulose is not only a building material from which paper can be made but is a chemical which can be reacted upon and which can be very useful in vastly different forms. Most people are, at least, accustomed to the fact that paper and nightgowns are the same substance in different forms. Thus there is a concept of what cellulose is, and regardless of the type of paper made, no one is startled to learn that they are all cellulose and no one regards the term itself as strange.

There is just about the same understanding abroad about lignin because of the problems it has created in pulp and paper manufacture. It is probable that very few men know lignin intimately as it has locked the key to its personality very deeply. Much has been written in the industry about its waste and some little has been done about reclaiming it, but there are still millions of tons of it going to waste. It probably represents the biggest unsolved industrial waste problem in the United States today and, because of that position, it has received enough publicity to be known. Lignin and cellulose together make up most of the wood and the pulp made from it; adding up to about 80% of the wood and about 90% of the pulp. The balance in both cases consists of "other carbohydrates" and at this point broad acquaintance ceases and mystery develops.

The fact that these other carbohydrates existed in wood has been known since 1838 but precise knowledge about them has grown slowly. It was shown that they were widely distributed in nature and that their presence in plants and trees varied with growth and condition of growth as well as varying between root, stem, and leaf. They were described as being "reserve cellulose" as opposed to the normal cellulose which entered into the structure of the cell wall. Later on it was learned that there was a chemical difference as these "other carbohydrates" reacted differently with acids than did the normal cellulose. When normal cellulose was treated with acid it hydrolyzed and the sugar glucose was the final product of the reaction, but closer examination showed that other sugars were present in the final stages of the hydrolysis of wood. These other sugars were identified as hexoses and pentoses and further work showed that the "other carbohydrate" group in the wood was much more easily attacked by acids than was the normal cellulose, hence the name "hemicellulose" was given to them. This name applies to a group of different substances which are present as a group and not as a single material and later on it will be shown how several different systems of terminology overlap and may have had something to do with the misunderstanding of these materials.

Hemicellulose

The hemicelluloses, until very recently, have been of most interest to the biochemists, or plant chemists, and their interest has been purely academic. That is both fortunate and unfortunate for the pulp and paper industry, which should be grateful that they had any interest at all. The unfortunate part is that their work has not had any direct bearing on pulp and paper. To their credit, however, is a large base of knowledge to build and enlarge upon, for beyond their work very little is known. As a result of their work the following can be taken as what is currently known about these substances.

Along with cellulose and lignin the materials termed other carbohydrates make up the tree. If the companions of cellulose are listed they line up like this:

[1] Member TAPPI; Technical Consultant, Bulkley, Dunton Pulp Co., Inc., New York, N. Y.

Pentosans . . . xylan, araban, methylpentosan
Hexosans . . . galactan, mannan
Pectin
Lignin
Lichenin
Resin, fat, wax, fatty acids, etc.
Miscellaneous mineral matter, coloring matter, protein material

Present interest centers in the first two groups and primarily in two members of those groups, xylan and mannan. These two substances on hydrolysis yield the sugars xylose and mannose which have the formula $C_5H_{10}O_4$ and $C_6H_{12}O_4$ respectively but in the wood and in the pulp they are not present as simple molecules but as complex groupings composed of many molecules believed to be formed into chains. Thus they are spoken of as having "chain-length" or a degree of polymerization. This last term is usually represented as D.P, and means simply the number of molecular groups forming the chain molecule.

Most of the hemicelluloses are soluble in alkali and usually the crude product obtained by alkali extraction can be separated into several different fractions according to their solubilities and hydrolytic products. Some of these isolated hemicellulose fractions contain uronic acids and for this reason it was proposed that these substances be called polyuronides leaving the term hemicellulose to apply to those substances which yield no uronic acids on hydrolysis. This terminology was not satisfactory and consequently was not long lived. It has been replaced by terms that give consideration to the relation of these hemicelluloses with cellulose itself. This relationship, for part of the group, is so intimate that no alkali extraction can ever get all the hemicellulose out, some of it always remains with the alpha fraction. Because of this fact it is believed that this group is longer in chain length, approaching the cellulose molecule in size. Thus the term "hemicellulose" is used to cover the whole group of "other carbohydrates" but is broken down in two sub-groups. Those hemicelluloses that are most intimately associated with the lignin are termed "polyuronide hemicelluloses" while those associated with the cellulose are called cellulosans. Another set of names comes from the alpha cellulose determination which breaks the pulp into three groups: alpha, beta, and gamma. The beta and gamma groups are soluble in alkali and differ from one another in their solubility in neutral solutions but they include practically all the hemicellulose in the pulp. They also include all the degraded cellulose caused by the cooking and bleaching procedures and because of that the beta and gamma determinations are of no value in determining the hemicellulose content of pulp. So far, the term "cellulosans" has not been used to any extent in the pulp and paper industry; hemicellulose is used almost exclusively. (It is interesting to note that the alpha determination fractionates the pulp into groups whose degree of polymerization is below 200. The beta fraction has a D.P. of 140 to 200, while the gamma fraction is 10 to 140. It has been determined through painstaking work that undegraded xylan has a D.P. of 150 and undegraded mannan 160. Through cooking, and the degradation that accompanies it, they would probably fall into both beta and gamma, depending on the severity of the processing.)

The substances xylan and mannan are properly considered part of the cellulosan group but they will be spoken of simply as hemicelluloses as explained above. It must be pointed out, however, that the nature of these substances in wood is variable and the chain length of the molecule would determine whether or not they fall into the cellulosan group. If the chain length is so short that they are amorphous they will be included in the incrusting materials of the cell wall while if the molecule is long it may become oriented and included in the cellulose miscelles. Xylan is widely distributed in nature and is particularly dominant in the hardwoods. In beech and birch it amounts to 20 to 26% of the wood. It is low in conifers, usually 4 to 6% and in some species as low as 1%. Mannan is common to the softwoods and probably fills the place occupied by xylan in the hardwoods. It runs as high as 7% in white spruce and as low as 1.5% in arborvitae.

The plant or botanical chemists have made extensive investigations on such woods as boxwood, mesquite, birch, lemon, and black locust. One can't help wondering why they picked these particular woods, some of which have practically no commercial value at all. The work they have done made it clear that the hemicelluloses are not homogeneous and the linkage between them and the cellulose and the lignin is exceedingly complex. They seem to stretch from the cellulose of the cell wall through the incrusting layer and into the lignin. There is indirect proof of a linkage with lignin in that they cannot be removed from wood without prior or concurrent delignifaction or some other treatment that might dissociate the linkage between them. It has also been shown that prior treatment will effect the hemicellulose removal. Kiln drying, air drying, aging, all have their effects.

Effect of Pulping Process

The normal commercial delignification processes are probably far more efficient in the removal of hemicellulose from wood than lignin and in nearly all cases where pulp is used for conversion into paper indications are that much could be saved in wood, and in the power required for stock preparation if these hemicelluloses were left in the pulp. This is not the case in the viscose rayon industry where these materials are very troublesome. The sulphite pulping process appears to completely remove the polyuronide hemicelluloses but some of the cellulosans are stable and remain in the final pulp. This process presents conditions which are very favorable to acid hydrolysis with the result that the less resistant materials are hydrolyzed to simpler compounds with some of them being completely degraded and dissolved. The formation of sugars to the extent of 22% of the dry weight of the wood is possible but normal operation results in much lower yields. The sugars usually found in sulphite waste liquors are xylose, mannose, and galactose with the latter two being fermentable. The temperature of the digestion and the base content of the liquor are the two most important factors affecting the yield of the sugars. Low temperatures of digestion and a high alkalinity of the liquor produce low yields of the sugars but conversely it is to be expected that these conditions would leave increased amounts of hemicellulose in the pulp. Recent studies of the sulphite process have shown that temperature is probably the most important single factor. This factor is not only operative on the lignin removal but also on the hemicellulose removal and the degradation of the cellulose. During the early part of the cook the rate of removal of the hemicellulose exceeds the rate of removal of the lignin. This ratio has been found to be of the order of 1:1.5 in the early stages of the

cooking and about 1:2 near the end of the cook. It was also determined, in these same studies, that temperatures above 140°C. are highly undesirable because of excessive degradation of the cellulose. In a study reported in 1944 Wultsh confirms this as his findings indicate that cooking temperature is far more important in determining the D.P. of the cellulose than is the time of digestion or the composition of the cooking liquor. He also found that before the so-called defiberation point is reached 60% of the hemicelluloses are lost.

The reaction of the hemicelluloses in the alkaline pulping processes is not much clearer than the sulphite. There is a similarity and that is in the removal of most of the hemicelluloses in the early part of the cook. Schorger has stated that the sulphite process removes more pentosans than the alkaline process but it must be emphasized that he was speaking only of pentosans and these do not cover the entire group of the hemicelluloses; it would not, for example, cover mannan. A sulphite pulp from a hardwood contains about the same amount of pentosans as a softwood pulp made by an alkaline cook. The Mitscherlich process produces a pulp higher in pentosan content than a sulphite pulp made under more drastic cooking conditions. In general it can be stated that with hardwoods the pentosan content is lower on sulphite pulps than on alkaline pulps; with softwoods the sulphite and soda processes remove approximately equal proportions of the pentosans originally present; the kraft process, with softwoods, is less effective in pentosan removal. It must be noted that these conclusions are based on pentosan content alone which roughly is the xylan content. This material is present in much greater quantities in hardwoods than in softwoods where it is replaced by mannan.

Effect on Beating

Thus the basic knowledge of hemicelluloses as it stands today has been compiled primarily by plant chemists. It has been applied to some slight extent by people working in pulp and paper but in that field the research has taken a different tack. These workers were not so much concerned as to what hemicelluloses were and where they were found but what they did in pulp and paper, what characteristics they promoted and what were their advantages or disadvantages. The search for these answers began with the question of what happens when pulp is beaten in the presence of water. This work led to the further question of whether beating was a physical or chemical reaction and although the answer to this is still somewhat in doubt there is a theory today that can explain most of the results of beating. This theory has been very well expressed by Clark. In the delignification or mechanical treatment of wood to prepare a pulp the primary wall of the fiber, which is permeable to, but is not swollen by water, is partially cracked, rubbed loose, or removed to expose some of the underlying surface of the fiber. When water enters the secondary wall (the body of the fiber) it causes it to swell to almost the original size it had in the living plant by entering in between the micelles and perhaps by bridging and breaking bonds between the secondary and the primary hydroxyl groups.

The rubbing, and the partial solvent action of the water, forms a kind of colloidal suspension of the cellulose and other carbohydrate material on the surfaces of the secondary wall. It is this water envelope that forms the so-called "water of hydration" and that gives rise to all the phenomena associated with it. The primary wall is not in any way water soluble and therefore whatever part of it remains forms a protective layer on the outside of the fiber. When the fibers are almost wholly covered with this layer, as in the unbeaten state, adjacent fibers in a wet web of paper are prevented from adhering to one another on drying, not only because of the absence of the colloidal suspension but because their diameters are so large when compared with the diameter of fibrils subsequently produced by beating.

As beating proceeds, besides rubbing off the primary wall and further wetting and swelling the fibers, the underlying material is more coarsely fibrillated which permits strong surface tension effects to act towards compacting the sheet of paper but it also results in the producing of a greater extent of bonding surface. Any cellulosic material that is rubbed off entirely serves as an adhesive filler between the interstices of the larger fibers. These may be the hemicelluloses of the pulp and they might also function as protective colloids making the surface colloidal suspension more stable. As the beating action proceeds further, a point is reached where the increase in bonding material and facilities for bonding are offset by decreased fiber length and a weakening of the fibers themselves by mashing and reticulation. At this point the pulp reaches maximum strength.

This theory of beating, with reference to the action of hemicellulose, would place them in the realm of "short chain-length material" which would more quickly form the surface suspension and at the same time make it more concentrated and more adhesive. There seems to be more to it than this, however, as shown by recent work. The difference between pulps high in hemicellulose content and those low in it are too great to be due only to the action of facilitating the formation of the surface suspension —however, this phenomena alone may be more important than thought. The theory is sound as far as it goes in explaining the complex results of beating pulp but there is still a void in it for explaining the action of the hemicelluloses.

Serious work on the hemicelluloses began about 1931 and it was demonstrated in 1933 that an increase in hemicellulose content gave added strength and less resistance to beating. This was done by adding xylan and mannan to the pulp and mannan was shown to be more effective than xylan. In 1937 Obermanns published a thorough study of the effect of added hemicelluloses on the beating reaction of rag stock and wood pulps. The hemicellulose which he added to the stocks were prepared from other pulps. From soda pulp, xylan was obtained and from sulphite pulp, the beta fraction was used. These were kept in the form of pastes and added to the beater in slurries. In all cases where the hemicellulose content of the pulp was increased by the addition of xylan or the beta fraction, an increase in strengths was noted but the beatability was particularly improved. A sulphite pulp with a beta plus gamma fraction of 17.8% was beaten to a freeness of 350 (Schopper-Riegler) in 45 minutes, but when the beta plus gamma fraction was increased by addition to 20.0% the same freeness was reached in 20 minutes. At the same time there is an increase in all the physical strengths. It was stated throughout that these increases in strength were probably due to the formation of a film binding the fibers together. It must be pointed out that this work centered about xylan and

the hemicellulose contents were determined throughout as pentosan content.

Holocellulose

This was almost the last direct work reported on hemicellulose. With the development of a method for isolating all the carbohydrates in wood, interest turned to what was termed "holocellulose." This is defined broadly as all the constituents of the wood with the exception of lignin and the study of holocellulose depended on the method of extracting the lignin without disturbing the other carbohydrates present. The procedure involves successive mild chlorinations followed by extraction of the soluble chlorinated lignin in a hot solution of ethanolamine in ethyl alcohol. Since holocellulose is very high in hemicellulose content studies of it have indirectly advanced the knowledge of hemicellulose. Houtz and Kurth studied the papermaking properties of holocellulose by fractionating it and determining the properties of the fractions. The first of these contained pentosans amounting to 8.76% based on the moisture-free wood but 12.6% based on the material. Another fraction was prepared by overchlorinating so as to remove the easily hydrolyzable pentosans and its content of these materials was 8.19%. This second fraction was further treated with sodium hydroxide so that its pentosan content was reduced to 2.3%. A comparison of the properties showed that the high pentosan fraction reduced to a Schopper-Riegler freeness of 400 in 20 minutes while the low content fraction required over 105 minutes to reach the same freeness. The physical strengths were much higher on the first fraction than on the latter one. This supported Obermanns' conclusions concerning the effect of hemicellulose and these workers felt that their study definitely substantiated the chemical theory of beating with the formation of a gelatinous hydrate. They felt that the hemicellulosic materials played a very important role in the development of this hydrate but could not be sure which constituent was responsible. They regarded the most important result of their work as being the production of a pulp which could be beaten to glassine stock in a remarkably short time as well as possessing desirable strength characteristics. They even felt that the procedure used for the isolation of holocellulose could be adapted commercially for the production of pulps for highly hydrated papers or for mixing with other pulps.

The Forest Products Laboratory continued its work in this field with the work aimed at more satisfactory methods of preparing holocellulose; methods by which it could be prepared in large quantities, and thorough investigation of the material itself. Van Beckum and Ritter determined yields of holocellulose on various woods as follows: (Percentages are based on moisture-free wood.)

	Holocellulose, %	Alpha from Holocellulose, %	Hemicellulose (by difference), %
Aspen	82.5	50.7	31.8
White spruce	72.3	49.5	22.8
Red spruce	72.9	48.3	24.6
Jack pine	72.5	49.5	23.0
Balsam fir	69.9	44.0	25.9
Eastern hemlock	68.5	48.2	20.3

The hemicellulose reported above is total carbohydrate other than alpha and therefore is slightly different than that discussed earlier. This paper also reported interesting data about viscosity which indicated little, if any, degradation in the process of preparing holocellulose. High hemicellulosic content is not indicative of a low viscosity and similar contents of two cellulosic materials from the same wood are not indicative of similar viscosities.

Development of Pulping Procedure

It seems to have been demonstrated beyond all reasonable doubt that a high hemicellulosic content is very desirable in wood pulps. It renders them easy to beat, saving power; it increases their strengths, and by preparing a pulp with a high hemicellulosic content the yield of pulp from the wood is increased considerably. This latter advantage would allow for some increase in the cost of manufacture. It also seems to be true that the two most important constituents of hemicellulose are xylan and mannan and of these two, mannan is probably the largest contributor to the effects noticed. Investigating the possibilities of producing a commercial pulp with a process similar to the procedure for determining holocellulose, Hajny and Ritter reported one that seems, at first glance, to be commercially economical. A semichemical cook is used as the first step after which the pulp is chlorinated and washed. It is then extracted with a dilute sodium sulphite solution, washed, and bleached with approximately 1% of available chlorine. Working with white spruce and using two chlorinations plus two sulphite extractions they prepared a pulp with an alpha content of 82.0% but with a yield from the wood of 62%. It was high in hemicellulose, having a total content of 18% with a pentosan content of 10%. Using a pulp very similar to this but extracting it with caustic soda (2% solution, 2 hours at 80° C.) they made a pulp suitable for white papers, obtaining a yield of 57% and an alpha content in the pulp of 85.8%. This pulp reduced in freeness very rapidly and possessed remarkable strength properties.

A recently published work from the Forest Products Laboratory shows that further work has been done on holocellulose by experiments on Douglas fir, one of the most difficult woods to pulp. Even after being prepared to a pulp Douglas fir will not make satisfactory paper because of its poor felting qualities and low bursting and tensile strengths. This wood was pulped by a modified holocellulose procedure beginning with a semichemical cook using a liquor containing sodium sulphite and sodium carbonate. The digestion was over a relatively short time—the longest being 4.5 hours—but the temperatures were rather high, 170 to 180°C. This pulp was broken up in a small beater and screened and then treated with mild chlorinations with extractions between. After the first chlorination the pulp was extracted with a 1% solution of monoethanolamine in hot ethyl alcohol and then washed with hot water until neutral to litmus. It was again chlorinated and washed but then extracted with a hot 1% solution of sodium sulphite in 60% ethyl alcohol. This latter treatment was repeated to remove the last traces of lignin. This unbleached holocellulose from Douglas fir had a permanganate number of only 1.5 and represented a yield of 57.2% based on the moisture-free wood. There was only a small loss during bleaching and the bleached holocellulose had an alpha content of 86.7% and a viscosity of 43.0 c.p. as compared to a standard bleached spruce sulphite viscosity of 15.1 c.p. The bleached holocellulose from Douglas fir possessed strengths equal to or better than the spruce pulp.

All the experimental work described above has proven that a new method of preparing wood pulp is at hand and it is one that will produce pulps with characteristics which we have never had. The holo-

cellulose procedure has been advanced from an analytical method to the point where it can produce pulp in small pilot plant batches. It would seem that sufficient experimental work had been done to move it to the pilot plant stage with batches amounting to several hundred pounds. There are "bugs" aplenty to be removed but there seems to be no question that the process warrants the step. The one expensive item is the alcohol solvent but if recovery of it could be worked into the process the total cost would not be much more than current processes and because of the increased yield might be lower. This item of increased yield is an important factor because of the diminishing wood supply in the immediate neighborhood of mills. If the yield can be pushed up from 45 to 55% there is an increase in wood utilization of 25% which is more than can be gained by hydraulic barking and whole log chipping.

Over the past 25 years there has been no basic improvement in the commercial pulping processes anywhere in the world. The improvements have all been directed toward a more efficient use of the old way of doing it. There have been circulation systems for a more uniform cook and shorter cooking times; acid plants have been modernized to produce uniform cooking acid; driers have been changed to produce a less degrading method of removing the water, and wood rooms have produced cleaner wood. All these have turned out wood pulps which are a little brighter in color, a little cleaner, a little easier to process and with some increase in strengths. Now, there seems to be at hand an idea for a real process change which would yield completely different pulps which in turn would lead to a wide range of new and better papers.

Bibliography

1. Jonas and Reith, *Wochbl. Papierfabr.* 64, No. 48: 853-855 (Dec. 2, 1933).
2. Obermanns, *Tech. Assoc. Papers* 20: 429-437 (1937).
3. Houtz and Kurth, *Tech. Assoc. Papers* 22: 329-332 (1939).
4. Van Beckum and Ritter, *Ibid.*, 619-22; *Paper Trade J.* 104, No. 19, (May 13, 1937); *Tech. Assoc. Papers* 23: 652-54 (1940).
5. Hajny and Ritter, *Tech. Assoc. Papers* 25: 595-599 (1942).
6. Peterson, Bray, and Ritter, *Paper Trade J.* 120, No. 22: 37-42 (July 12, 1945).
7. Wise, Wood chemistry. Reinhold Pub. Corp., 1944.
8. Heuser, Cellulose chemistry. Wiley, 1944.
9. Marsh and Wood, Chemistry of cellulose. D. Van Nostrand, 1942.
10. Ott, Cellulose and its derivatives. Interscience, 1943.
11. Norman, A. G., Biochemistry of cellulose. Clarendon.

Canadian PPA in Session

More than 800 representatives of the largest manufacturing industry in Canada are expected to gather in Montreal Wednesday, January 23rd, for the three-day annual meeting of the Canadian Pulp and Paper Association, according to announcement made to A. E. Cadman, general manager of the association. "The coast to coast representation at the meeting," said Mr. Cadman, "will include technical men, engineers, chemists, woods managers, foresters, and executives who will study the woodlands, technical and other phases of the industry's efforts."

Program of the annual meeting includes meetings of the Technical and Woodlands Sections, both morning and afternoon, on January 23, 24, and 25. At the group sessions scheduled for these three days, problems of production, research, woods management, and a variety of other subjects pertaining to the industry will be discussed; papers will be presented by members of the industry and others closely connected with it.

The annual general meeting of the Canadian Pulp and Paper Association takes place on January 25th at 11:00 A.M. It will be followed by the annual luncheon at which a record attendance is expected.

Lake States TAPPI Discusses Barking

The January meeting of the Lake States Section of the Technical Association of the Pulp and Paper Industry was held on January 8th at the American Legion Club House in Appleton, Wis. The program dealt with the barking of wood and consisted of two parts.

A movie was shown illustrating the action of the Nekoosa portable wood peeler, developed by the Nekoosa Foundry and Machine Works, on a variety of species, sizes and seasons of cutting.

A paper titled "Barking Logs Hydraulically" was presented by J. A. Fritz of the Allis Chalmers Company. Mr. Fritz described the Streambarker and showed a number of slides including frozen wood and wood down to 2" in diameter. A number of questions and considerable discussion followed the two presentations.

Those present included: Alan Adrian, Francis J. Allard, R. P. Anderson, L. R. Ayers, S. J. Baisch, H. P. Baldwin, J. W. Bard, J. S. Barton, Arnold G. Beaman, H. A. Bergerson, Paul Boronow, Maurice C. Boyer, R. Branzel, M. F. Bretl, L. J. Broehm, A. H. Bunks, C. Y. Cain, Glenn Carroll, A. Coffin, H. C. Crane, H. J. Desotell, H. P. Dixson, Franke Donarski, C. L. Durkee, Henrik Eklund, S. E. Ekman, C. R. Faulkender, L. V. Forman, John Francois, J. W. Fritz, H. V. Frederick, Norbert Frewlud, John Graff, John Grimes, John Handeyside, R. W. Henschel, H. W. Hillier, R. N. Holland, T. A. Howells, E. G. Ingalls, Irving Isenberg, Peter E. Jones, Leif Jorgenson, F. Kraft, A. R. Kjellgren, L. L. Klinger, F. X. Kreiling, Clarence Kronquist, O. J. Krueger, Otto Kuemmerling, C. Larsen, Alex Laux, A. J. Luth, N. L. Malcove, A. E. May, W. M. McGraw, Wm. Monsson, Donald D. Niemeyer, R. A. Nugent, T. W. Olson, A. Phillips, H. F. Podvin, S. W. Pollock, T. R. Probst, J. Quell, C. F. Reinhardt, C. E. Schaefer, E. C. Schuler, H. K. Sheldon, R. H. Siple, L E. Smith, R. G. Smith, Harold Stegeman, Calvin Stewart, R. A. Stillings, E. E. Thomas, J. A. Van den Akker, Cornelius Van den Boom, Wm. Verhagen, J. K. Welch, J. D. Wells, Sidney D. Wells, H. L. Wendshuh, P. H. West, B. G. Wingersky, G. M. Wissink, J V. Ziemann, W. A. Zormen.

New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Adrien F. Albarranc, Consulting Engineer, Papeteries Navarre, 7 bix rue de Teheran, Paris 17, France, a 1933 graduate of University of Grenoble, France.

Hassan I. Badawi, Technical Director of Pulp Factory, The Egyptian Cellulose Factory, Cairo, Egypt, a 1944 graduate of the Swiss Federal Institute of Technology.

Michael J. Goloff, Mechanical Superintendent and Plant Engineer, Consolidated Paper Corporation, Port Alfred, P. Q., Canada, a 1920 graduate of the Kharkov Institute of Technology.

J. Wayne Morrow, Technical Director, Newton Falls Paper Mill, Newton Falls, New York, a 1933 graduate of the New York State Ranger School.

Rodolfo A. Beeck Navarro, Chemical Engineer in charge of Pulp Plant Societe Agricola Paramonga, W. R. Grace Company, Hacienda Paramonga, Peru, a 1943 graduate of University Tec. Santa Maria, Valparaiso, Chile.

The Effect of Alkaline Pulping On the Acetylating Properties of Wood Pulp

By J. W. McKinney[1]

Abstract

The extreme haziness of solutions of cellulose acetate prepared from purified pulps cooked by alkaline processes is well known. In a search for the cause of this haze, the effects of modifications of the kraft pulping conditions on the final acetylation clarity were investigated.

The modifications in kraft cooking procedure studied included low-temperature cooks, variations in the sulphidity of the cook, and alkaline pretreatment of the chips. No improvement in acetylation clarity resulted from the application of these methods. However, a mild precook with sulphite cooking acid or with dilute sulphuric acid resulted in a great reduction in the amount of haze. But if this sequence is reversed, with the sulphite cook following the kraft cook, there is no improvement in clarity.

In order to determine whether haze-producing substances were formed from cellulose itself under alkaline pulping conditions, relatively pure cellulose in the form of cotton linters was cooked with kraft liquor under conditions substantially the same as those used for wood. No increase in haze was noted.

A possible explanation of these facts in the formation of anhydro-hemicelluloses during an alkaline cook is advanced.

Kraft wood pulps are obviously different from sulphite pulps in many ways, but as improved refining methods have made available kraft-base pulps of higher and higher purity, these fibers have been used in some fields once reserved exclusively for purified sulphite, e.g., in the nitration field large tonnages of sulphate-base pulp are now consumed in the manufacture of propellants. Accordingly the cellulose chemist may well wonder how deep-seated the chemical differences between kraft and sulphite really are. However, even the most carefully purified kraft pulps have not proved suitable for the best viscose or cellulose acetate. This poses the problem as to whether the troubles encountered arise from chemical changes in the pulp which take place during a kraft cook or are due merely to unremoved woody impurities which might be eliminated by improved methods of refining and bleaching. The work reported in this paper is particularly concerned with the failure of kraft pulp, even though highly purified, to give satisfactory acetates.

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Acetylation Procedure

The latest acetylation procedure developed in this laboratory makes use of continuous mechanical stirring. By following a standard temperature curve and stopping the reaction within a specific viscosity range it is possible to obtain an evaluation of the suitability of any cellulose sample for acetylation. The procedure is flexible enough to deal with almost any type of cellulose, including cotton, so that direct comparisons are possible.

One of the tests used to judge the acetylating quality of a pulp is the amount of haze in the final acetylation syrup. The substances giving rise to haze have not been identified, but syrups prepared from cotton linters are fairly clear. The usual criterion of haziness is the "clarity" reading (inverse of haze) which is the depth of syrup in centimeters through which a hook at the end of a rod of definite size lowered into a glass tube is just visible under standard illumination. Normal levels of clarity for the various types of pulp are as follows: sulphite pulp, 4; moderately purified sulphite pulp, 7; cotton linters, 15; highly purified sulphite pulp, 25.

Comparison of Sulphite and Kraft Pulps

An ordinary sulphite pulp acetylates rather poorly to give a very hazy syrup. Even a moderately purified sulphite pulp of 94% alpha-cellulose content gives a rather hazy syrup although satisfactory in other ways. Since such purified pulps still contain about 2.5% of pentosans, it is natural to suspect that this impurity causes the difficulty. As a matter of fact an acetylation pulp can be prepared from a sulphite base stock by a suitable purification sequence to contain less than 1% pentosans and with an alpha-cellulose of 98%, which is readily acetylable and gives very clear syrups.

An unpurified kraft pulp will swell but scarcely dissolve in the acetylating mixture. A bleached kraft which has been moderately refined will dissolve but gives an extremely hazy, grainy syrup. Even when brought up to 98% alpha-cellulose a purified kraft pulp still gives an acetylation clarity of only about 5. It would thus appear that in some respects kraft pulp is fundamentally different from sulphite. With the object of throwing light on this difference, experiments were carried out to examine the acetylating properties of pulp prepared by various modifications of the kraft process.

TABLE I.—COMPARISON OF PULPS FROM NORMAL AND LOW TEMPERATURE KRAFT COOKS

	Number	Ratio, Liquor-wood	Na_2O Based on Wood %	Sulphidity %	Maximum Temperature ° F.	Time to Maximum Temperature hrs.	Time at Maximum Temperature hrs.	Yield %	$KMnO_4$ No.	Pentosans %	A.C.S. Viscosity Poises	I.P.C. Lignin %
Normal Cooks												
Softwood	1	4.5	22.7	27	335	2	4	42.3	9.9	5.9	10.8	2.7
Hardwood	2	3.5	17.3	30	320	2	6	52.7	10.8	18.8	47.7	2.7
Low-Temperature Cooks												
Softwood	3	8.0	60.0	27	295	2	13	39.6	9.7	4.9	7.2	1.9
Hardwood	4	8.0	40.0	30	275	2	13	49.6	10.5	16.3	45.1	3.9

Alkaline Treatment of Wood

Effect of Cooking Temperature

The usual cooking curve for kraft goes some 40°F. higher than the normal sulphite curve and therefore is near the point of initial thermal instability of the cellulose. One method of attack, therefore, was to make kraft cooks at sulphite temperature and determine whether any improvement in acetylating clarity was obtained.

Two types of wood were used: (a) softwood chips, a mixture of spruce and balsam fir; (b) hardwood chips, predominantly birch, with some maple and beech. Naturally, to cook satisfactorily with kraft liquor at the lower temperature, other conditions had

TABLE II.—COMPARISON OF PURIFIED PULPS FROM NORMAL AND LOW-TEMPERATURE KRAFT COOKS

	Number	Alpha-Cellulose %	Pentosans %	A.C.S. Viscosity Poises	Clarity
Normal Cooks					
Softwood	1	96.0	1.3	1.3	5.5
Hardwood	2	98.1	3.5	4.1	5.0
Low-Temperature Cooks					
Softwood	3	94.5	0.9	0.6	4.5
Hardwood	4	98.3	2.9	4.1	5.0

to be modified. By increasing the ratio of liquor to chips, the alkali concentration of the liquor, and the time of cooking, well-cooked pulps were finally obtained. Cooking conditions and analyses of raw stocks are as given in Table I. (Average of two cooks in each case.)

These samples were re-treated and bleached by a special sequence which included a treatment with strong caustic soda solution. After acetylation by the standard procedure, the clarity of the final acetylation syrups was measured. Chemical tests of the finished pulps are given in Table II, together with the clarity readings. As will be seen from the table, no improvement in clarity was realized from the lower pulping temperature.

Effect of Variations in Sulphidity

In order to test the possibility that the sodium sulphide might have an adverse effect, a series of cooks were made on hardwood in which the sulphidity was varied from zero to 100%. Cooking conditions used in this series were as shown in Table III.

These raw stocks were re-treated by the same sequence as before. Also re-treated was a sample (No. 10) of unbleached soda pulp obtained from commercial channels. The results of the tests are given in Table IV. Evidently the presence or absence of sodium sulphide has no significant effect on haze.

Effect of Alkaline Pretreatment of Chips

This is a subject which has received attention from time to time. Wells *(1)* proposed putting the digester under hydrostatic pressure before beginning to cook. In a recent thesis at the Institute of Paper Chemistry, Max *(2)* describes mercerization of chips followed by sulphite and soda cooks.

The possibilities of these pretreatments for improvement of haziness were explored by making several kraft cooks using hardwood chips. The pretreatments employed were as follows:

(Exp. 11) Chips were soaked in 18% NaOH solution for 7 days at 20° C. at which time penetration appeared to be complete. Washing was then carried out in running water for 3 days after which a sample showed a loss in dry weight of 8%.

(Exp. 12) Chips were covered with kraft liquor and put under 150 p.s.i. nitrogen pressure for 2 hours at room temperature and were then cooked in the same liquor.

(Exp. 13) Liquor was preheated to 220° F. and then added to the chips. Cooking was immediately started, the initial temperature being 100° F.

(Exp. 14) Control (no pretreatment).

(Exp. 15) Chips were soaked in kraft liquor for 24 hours at room temperature and were then cooked in the same liquor.

The cooking conditions and raw stock tests are given in Table V. These raw stocks were all refined as usual except for No. 11 which had had the mercerizing treatment. In this case an extra bleaching step was required and even so, the refined pulp was still low in brightness. Tests on the final pulps are given in Table VI.

The results did not show any marked differences because of the pretreatments although mercerization of chips seemed to make the stock hard to bleach. It is significant that none of the pretreatments gave any improvement in acetylation clarity.

Effect of Kraft Cooks on Cotton Linters

An important point in deciding whether alkaline cooks act deleteriously on certain wood constituents is to determine the effect on relatively pure cellulose. This would show whether the cellulose itself is affected or whether some of the other constituents of the wood are the source of difficulty. Accordingly some cooks were made on two samples of cotton linters, one of which was a nitration grade and the other of acetylation quality. Three cooks of increasing severity were made on each sample although conditions were necessarily kept milder than those used in pulping wood chips since it was desired to avoid undue degradation

TABLE IV.—PURIFIED PULPS FROM KRAFT COOKS VARYING SULPHIDITY

Number	Alpha-Cellulose %	Pentosans %	A.C.S. Viscosity Poises	I.P.C. Lignin %	Clarity
5	98.5	2.7	6.0	0.24	5.0
6	98.9	2.8	7.6	0.17	5.5
7	97.9	2.1	3.7	0.35	5.5
8	97.8	2.9	5.9	0.16	5.0
9	97.1	2.9	1.3	0.22	4.5
10	96.3	2.8	0.8	...	4.0

of the cellulose. The viscosity values of the cooked linters are an indication of the severity of the cook in each case. (See Table VII.)

All samples were given a light bleach with sodium hypochlorite and then acetylated. Chemical tests and acetylation clarity on both the original and bleached samples are given in Tables VIII and IX. All of the samples show a marked improvement in clarity, which is probably because of the removal of dirt by the cooking. Certainly there is no evidence of the formation of haze-producing bodies by the kraft cook.

TABLE III.—PULPS FROM KRAFT COOKS WITH VARYING SULPHIDITY

	Number	Ratio, Liquor-wood	Na_2O Based on Wood %	Sulphidity %	Maximum Temperature ° F.	Time to Maximum Temperature hr.	Time at Maximum Temperature hr.	Yield %	$KMnO_4$ No.	Pentosans %	A.C.S. Viscosity Poises	I.P.C. Lignin %
Hardwood	5	3.5	17.3	0	320	2	2.5	38.1	18.0	19.6	....	6.8
Hardwood	6	3.5	17.3	25	320	2	2.5	48.9	14.2	18.9	163	3.4
Hardwood	7	3.5	17.3	50	320	2	2.5	48.9	14.2	18.1	422	3.7
Hardwood	8	3.5	26.7	75	320	2	10	48.0	9.8	17.2	8.9	2.2
Hardwood	9	3.5	26.7	100	320	2	10	45.8	14.8	18.6	....	3.7
Unbleached soda pulp	10	..	...	...	...	..	..	...	7.2	12.2	2.6	3.1

TABLE V.—PULPS FROM KRAFT COOKS WITH PRETREATMENTS

Number	Ratio, Liquor-wood	Na_2O Based on Wood %	Sulphidity %	Maximum Temperature ° F.	Time to Maximum Temperature hr	Time at Maximum Temperature hr	Yield %	$KMnO_4$ No.	Pentosans %	A.C.S. Viscosity Poises	I.P.C. Lignin %
11	3.5	17.3	30	320	2	4	53.8	11.0	16.4	....	1.2
12	3.5	17.3	30	320	2	2.5	51.6	13.6	17.5	108	0.6
13	3.5	17.3	30	320	2	4	50.5	12.3	19.1	114	0.5
14	3.5	17.3	30	320	2	4	51.1	12.5	18.1	57	1.0
15	3.5	17.3	30	320	2	4	50.0	11.8	18.3	64	0.8

Effect of Acid Precooking of Chips

The idea of combining two types of cook to improve pulp quality is well known. Many types of cooking with various sequences have been used. One of the most successful appears to be a mild sulphite cook first, followed by a kraft cook. Recently several European investigators have worked on this idea, especially with the object of making low-grade wood, such as beech, available for viscose manufacture, e.g., Sirakoff *(3)* gives beech a precook with water followed by a soda cook. Marpillero *(4)* reviews recent work and also has a patent *(5)* on a double sulphite cook. Jayme *(6)* has also published work along the same line. The claim is made that the resulting pulps are low in pentosans and are suitable for xanthation.

In order to examine the effect of this type of pulping on clarity, several double cooks were made using hardwood chips as before. The precook was carried out under conditions not sufficiently severe to pulp the chips; the second cook was a kraft-type cook in every case. Details of these cooks are given in Table X.

These pulps were re-treated by a sequence similar to that used for the kraft pulps but somewhat simpler. As it happened, the pulp from the sulphuric acid precook was badly overcooked and required two extra bleaching steps. Even then the brightness was low. Results on the finished pulps are given in Table XI.

TABLE VI.—PURIFIED PULPS FROM PRETREATMENT SERIES

Number	Alpha-Cellulose %	Pentosans %	A.C.S. Viscosity Poises	I.P.C. Lignin %	Clarity
11	97.6	4.1	1.0	0.13	4.0
12	98.1	4.1	4.8	0.21	3.5
13	97.1	3.1	2.2	0.20	4.0
14	98.3	3.6	9.8	0.17	4.0
15	98.3	3.5	8.8	0.16	4.0

The pulps precooked with free SO_2 or sulphuric acid gave good clarities, while those precooked with bisulphite or water were intermediate in this respect although much better than any which had been prepared by a straight alkaline cook. Cooking with water is essentially an acid cook because of the generation of acids from the wood; therefore it may be said that an acid precook is very effective in yielding an alkaline-cooked pulp with good acetylating clarity.

Effect of a Reversed Double Cook

In order to complete this series, several double cooks were made with the sequence reversed, that is, a kraft cook was followed by a sulphite cook. The sulphite cook would remove any impurities present in the wood which had survived the kraft cook and should also add to the effectiveness of the bleaching steps. An ordinary kraft cook was first given to hardwood chips in all cases. Two of the sulphite cooks which followed were soda base cooks with a low ratio of combined SO_2; the third used only free SO_2. Details of the cooks are given in Table XII. These samples were re-treated and bleached as usual and were then acetylated. Results are given in Table XIII.

The fact that there is no improvement in clarity is further evidence that intractable compounds are formed during a kraft cook which can not be removed later.

Discussion

It has been shown that purified pulps from alkaline cooks consistently gave hazy syrups when acetylated. This haze was not reduced by: (1) special purification of the pulp, although pentosans were reduced to less than 1%; (2) reducing the temperature of the kraft cook by some 40 to 45°F. in imitation of sulphite conditions; (3) various alkaline pretreatments of the chips, including mercerization. Haze can be greatly reduced by an acid precook, but a sulphite cook following a kraft cook is quite ineffective. It was also observed that kraft cooking of cotton linters not only failed to produce any haze but actually improved the acetylation clarity.

If the alkaline cook were merely failing to remove some constituent of the wood such as hemicelluloses (kraft raw stocks are higher in pentosans than sulphite), it should be possible to remove any such interfering substance by suitable refining methods. Since removal of the haze-forming material has not been accomplished even by drastic methods of purification, it is likely that some intractable compound is formed during the alkaline cook which is not formed under acid pulping conditions. Once formed, this compound cannot be removed by a subsequent sulphite cook. On the other hand it is not formed during an alkaline cook which follows an acid precook.

A clue to the type of reaction which could cause such an effect is given by the work of Hudson *(7)* on the phenolic glucosides in his work on sugar chemistry. He shows that when such compounds are hydrolyzed under alkaline conditions there is a strong tendency toward the formation of anhydro sugars. Thus β-phenyl glucoside gives laevoglucosan.

Moreover, the work of Purves *(8)* makes it probable that when certain cellulose derivatives are hydrolyzed by alkali, cross-linkages between cellulose chains are set up. These bonds are apparently of the ether type being stable enough to survive complete hydrolysis of the cellulose with strong hydrochloric acid. Anhydro diglucoses were identified in the prod-

TABLE VII.—KRAFT COOKS OF COTTON LINTERS

	Number	Ratio Liquor-Fiber	Na_2O Based on Fiber	Sulphidity, %	Maximum Temperature, ° F.	Time to Maximum Temperature hr.	Time at Maximum Temperature hr.	A.C.S. Viscosity Poises
Nitration linters	16	11.3	5.7	27	320	1½	0.25	6.8
Nitration linters	17	11.3	5.7	27	320	1	3.5	2.7
Nitration linters	18	11.3	11.5	27	320	1	3.5	1.6
Acetylation linters	19	11.3	5.7	27	320	1	0.25	16.6
Acetylation linters	20	11.3	5.7	27	320	1	3.5	12.4
Acetylation linters	21	11.3	11.5	27	320	1	3.5	1.9

TABLE VIII.—COOKED AND BLEACHED NITRATION LINTERS

Number	Alpha-Cellulose %	Beta-Cellulose %	Gamma-Cellulose %	Pentosans %	A.C.S. Viscosity Poises	I.P.C. Lignin %	Acetylation Clarity
Original	98.8	0.6	0.6	0.4	9.1	0.30	8.0
16	98.6	0.7	0.7	0.4	3.5	0.11	16.5
17	98.1	1.1	0.8	0.8	2.1	0.16	18.5
18	97.7	1.5	0.8	0.5	1.3	0.14	17.0

ucts. These cross-linked or "anhydro" cellulose derivatives were shown to be insoluble in a number of good solvents for the original cellulose derivatives.

Thus the formation of cross-linkages between large molecules such as cellulose may well be promoted by alkali under proper conditions just as it is in the case of the smaller sugar molecules. Since it is reasonably well established that part of the lignin in wood exists as a lignin-hemicellulose complex and that bonds of the phenolic glucoside type are involved *(9)*, it may be reasoned by analogy that these bonds are broken in alkaline solution with simultaneous formation of anhydro-hemicelluloses. This is the specific hypothesis proposed to explain the findings of this series of experiments. Such cross-linked compounds would be expected to be very stable and thus difficult to remove

TABLE IX.—COOKED AND BLEACHED ACETYLATION LINTERS

Number	Alpha-Cellulose %	Beta-Cellulose %	Gamma-Cellulose %	Pentosans %	A.C.S. Viscosity Poises	I.P.C. Lignin %	Acetylation Clarity
Original	99.5	0.2	0.3	0.7	56.3	0.23	11.5
19	98.8	1.0	0.2	0.4	12.5	0.13	14.5
20	98.9	0.6	0.5	0.4	7.2	0.11	12.5
21	98.5	1.0	0.5	0.4	1.8	0.15	17.0

by any treatment that would not destroy the pulp itself. Also their derivatives would be much less soluble than the corresponding cellulose derivatives giving rise to haze in cellulose acetate and perhaps to a poor filtering viscose.

The evidence of these experiments seems to be against the cellulose itself being cross-linked during alkaline pulping, as the following considerations show:

First, the fact that cellulose in the form of cotton linters does not yield a product of increased haziness after an alkaline cook shows that cellulose itself does not cross-link. Of course this finding applies only to pure cellulose, and cannot be interpreted as disproving

TABLE X.—PULPS FROM KRAFT COOKS WITH PRECOOKS

First Step

Number	Dry Weight of Chips, g.	Free SO_2, %	Combined SO_2, %	H_2SO_4 Solution, %	Maximum Temperature, °F.	Time to Maximum Temperature, hr.	Time at Maximum Temperature, hr.	Sugar in Liquor, Based on Wood, %
22	4500	1.3	1.0	..	275	2	3	...
23	4500	(dist. water)		..	300	2	4	6.5
24	4500	..	..	1	320	1	1	6.9
25	4500	5.1	..	..	250	5	2	13.8
26	4500	5.1	..	..	250	2	1	11.0

Second Step

Ratio Liquor/Wood	Na_2O Based on Wood, %	Sulphidity, %	Maximum Temperature, °F.	Time to Maximum Temperature, hr.	Time at Maximum Temperature, hr.	Yield, %	$KMnO_4$ No.	Pentosans, %	A.C.S. Viscosity Poises	I.P.C. Lignin, %	Ether Solubles, %
4.5	15	30	320	2	2.5	44.3	6.4	5.1	191	1.8	0.6
4.5	16	30	320	2	2.5	42.9	7.0	4.0	238	2.2	0.6
4.5	15	30	320	2	2.5	20.2	16.2	1.1	6.5	5.0	0.9
4.5	15	30	320	2	2.5	32.8	6.7	1.6	32	1.9	1.2
4.5	15	30	320	2	2.5	33.1	9.9	1.8	103	2.9	0.5

TABLE XI.—PURIFIED PULPS FROM KRAFT COOKS WITH PRECOOKS

Number	Alpha-Cellulose %	Beta-Cellulose %	Gamma-Cellulose %	Pentosans %	A.C.S. Viscosity Poises	I.P.C. Lignin %	Acetylation Clarity
22	98.4	0.9	0.7	1.3	2.5	0.13	8.0
23	98.8	0.7	0.5	1.3	2.6	0.20	7.5
24	71.0	28.5	0.5	1.1	0.32	0.28	13.5
25	97.4	2.1	0.5	1.0	2.4	0.08	11.0
26	97.2	1.9	0.9	1.0	1.6	0.18	14.5

the existence of the hypothetical lignocellulose complex in wood. If this complex were present, obviously it could be hydrolysed by alkali to furnish the nascent bonds necessary for cross-linking, although probably less readily than lignohemicellulose. Yet, available hydroxyl groups must be present in cotton linters; these are held within possible reacting distance by the orientation of the chains and are activated by the alkali so that some opportunity for reaction certainly exists. The fact that no cross-linking occurs indicates that only cellulose compounds can undergo such a reaction.

Second, the fact that highly purified hardwood kraft pulps still contain 3% pentosans points to the presence of cross-linked hemicellulose. At first glance the lower

TABLE XII.—PULPS FROM REVERSED DOUBLE COOKS

First Step

No.	Dry Weight of Chips, g.	Ratio Liquor/Wood	Na_2O Based on Wood, %	Sulphidity, %	Maximum Temperature, °F.	Time to Maximum, hr.	Time at Maximum, hr.
27	4500	4.5	17.3	30	320	2	1
28	4500	4.5	17.3	30	320	2	1
29	4500	4.5	17.3	30	320	2	1

Second Step

Free SO_2, %	Combined SO_2, %	Maximum Temperature, °F.	Time to Maximum, hr.	Time at Maximum, hr.	Yield, %	$KMnO_4$ No.	A.C.S. Viscosity Poises
3.3	0.26	270	4	1	50.7	15.3	36.7
3.3	0.26	270	4	1	48.2	16.1	23.3
3.6	0	270	4	1	44.3	10.2	4.8

pentosan content of comparable softwood pulps might seem to contradict this, but actually both facts fit in readily with the hypothesis. These anhydro-hemicelluloses would not be soluble in caustic coda, hence the pulps would show a high apparent alpha-cellulose while still giving hazy acetates. This is the case with both hardwood and softwood. But in hardwood one would expect to find anhydro-xylan, which would show in the analysis as pentosan, whereas in softwood kraft pulp the cross-linked material would be largely mannan and would give little furfural on analysis.

Acknowledgment

Credit is due to Mr. T. M. Brown, under whose direction all of the cooks listed were carried out, and

TABLE XIII.—PURIFIED PULPS FROM REVERSED DOUBLE COOKS

No.	Alpha-Cellulose %	Pentosans %	A.C.S. Viscosity Poises	Acetylation Clarity
27	98.2	2.5	29.0	4.5
28	98.0	2.3	22.1	4.5
29	96.7	1.9	1.9	6.0

to Dr. C. W. Thing, who supervised the re-treatment and bleaching of the pulps.

Literature Cited

1. Wells, *Paper Trade J.* 80, No. 11: 55-57 (1925).
2. Max, K. W., Master's Thesis, Inst. of Paper Chemistry, 1941.
3. Sirakoff, G., *Holtz Roh und Werkstoff* 4, No. 6: 205-208 (1941).
4. Marpillero, P., *Papier-Fabr.* 40, No. 3-4, 9-13 (1942).
5. Snia Viscosa, Italian pat. 2134 (1941); German pat. Aug. 20, 1941. See also German pat. 695,489, July 25, 1940.
6. Jayme, G., *Papier-Fabr.* 28: 277-285 (1940); *Die Chemie* 55, No. 43-44: 221-225 (1942).
7. Montgomery, Richtmeyer, and Hudson, *J. Amer. Chem. Soc.* 65: 3-7 (1943).
8. Gardner and Purves; *J. Amer. Chem. Soc.* 65: 444 (1943); Gladding and Purves, *J. Amer. Chem. Soc.* 66: 76 (1944).
9. Ott, Cellulose and Cellulose Derivatives, Interscience, New York, 1943, p. 433-5 (Norman); p. 450 ff. (Brauns).

New England TAPPI Discusses Form Factor

The New England Section of the Technical Association of the Pulp and Paper Industry met at the Hotel Statler, Boston, Mass., on Friday evening, January 18, 1946. About 100 attended. L. B. Tucker of Crane & Co. presided as chairman.

The meeting started at 4 p.m. with a social get-together. This was followed by the showing of the Hercules Powder Company film "Careers for Cellulose." Following the dinner the principal speaker was Prof. E. R. Schwartz of the Massachusetts Institute of Technology who talked on Form Factor.

This was an unusual presentation dealing with the philosophy and theories underlying materials and their evaluation. He pointed out that the paper, textile and leather industries are inadequate relative to their testing methods. Most tests are based on those used for metals and should be completely reviewed with a new kind of analytical thinking. In making tests on materials and operations an effort is made to control every variable but one and to examine that one. When this is done that particular variable does not act in the way it would if the other variables were not controlled. The average of a number of tests is not necessarily the sum of the results divided by that sum.

Most tests are measurements of the factors relating to the instrument itself rather than of the product being measured. There is a need to develop an entirely new terminology and modern statistical methods will play a more important part in the future analysis of test results than it has in the past.

Dr. Schwartz pointed out that TAPPI has done a much better job in developing standard testing methods than most industries. However, a new concept of testing must be evolved. For example when paper is converted to a new form such as a container the evaluation of the latter is quite distinctly different than that of the evaluation of the sheet itself. Much new basic testing information must be developed.

He described the facilities and plans of the new Slater Laboratory at M.I.T. where all testing is to be electronically controlled, when the Edgerton camera taking 20 pictures per second, and the oscillograph will show the test specimen failure that may take place in 1/10000 of a second. There will be scanning screens similar to radar that will show what actually goes on in a sample during its period of test. The results will be recorded on a magnetized wire that can later be run in slow motion to show what actually happened.

Although Dr. Schwartz' presentation was difficult to follow since it required a mental approach differing much from present conceptions he demonstrated his points visually and showed the importance of the factor of the form of the material when any material is being considered. This was an entirely new type of technical presentation, about which much more will be heard in the future.

Those present included: Joseph J. Aid, R. D. Armstrong, John P. Bainbridge Jr., H. T. Barker, Gordon L. Benson, Bernard B. Blaney, R. B. Bohaker, J. M. Booth, Howard S. Brightman, Arthur M. Brooks, J. G. Bullard, Thomas M. Burton, John B. Calkin, Mr. and Mrs. J. F. Carey, George S. Carroll, R. C. Charron, Joseph Coburn, Parkman A. Collins, C. H. Child, Joseph E. Connell, H. C. Cookingham, E. T. Costello, E. T. A. Coughlin, Lester W. Crouse, Earle C. Davis, C. C. Decker, Paul A. Donaghy, Mr. and Mrs. R. H. Doughty, Warren T. Ferguson, E. E. Forslind, J. A. Fraser, Albert F. Gilmore, Howard L. Glass, Howard M. Hall, Chris Hammond, J. E. Hart, A. L. Hayes, Parker B. Holden, C. Quincy Ives, M. Jacobs, Edward T. Jones, O. C. Kees, R. E. Kilty, Paul I. Knight, Warren S. Kumblad, Booth G. Leavitt, Herbert S. Leonard, R. B. LeRoy, Charlie Lewis, Ross O. Lindsey, F. H. Lovenberg, B. L. Mann, Stanley F. Marr, R. C. Marvin, B. Mayo, H. L. Mellen, C. Morganstern, Paul H. Mueller, F. W. Nason, Albert E. Neil, W. W. Nelson, Geo. E. Niles, Frank Nyborn, J. J. O'Brien, Edward Parker, Henry J. Perry, E. A. Poirier, Edward O. Reed, A. E. Regnier, George H. Rhodes, Rene Rigau, Fred W. Schnieder, L. G. Simons, Hervey J. Skinner, Patricia Shattuck, G. C. Schmid, Norman G. Sixt, C. P. Slocum, Claude H. Smith, W. P. Stillman, Wm. Strecker, F. A. Strovink, James E. Sullivan, Alvar Svens, Arnold F. Sylvester, E. L. Tewksbury, L. B. Tucker, James A. Valentine, A. K. Warner, B. D. Warren, Jenney Wasilunas, W. E. Wentworth, R. Cameron Whitney, W. S. Wilson, Arthur M. Worthington, Jr., J. F. Wright.

TAPPI Notes

Capt. Waldo J. Chastant is now chemist for the Southern Kraft Division, International Paper Company, Springhill, La.

Robert M. Nelson has succeeded R. A. Dadisman as the official representative of the American Rolling Mill Company, Middletown, Ohio.

The TAPPI Ohio Section will meet at the Manchester Hotel, Middletown, Ohio, on Tuesday, February 5, 1946. There will be a round table discussion of paper strength tests.

The Allis-Chalmers Mfg. Co. will salute the pulp and paper industry during its broadcast over the Blue Network on Saturday evening, February 23, 1946, at 9:30-10:30 p.m. This program features the Boston Symphony Orchestra.

Correction—TAPPI Standard T 469 sm-45 Flexural Resistance and Deflection of Fiberboard (published in the PAPER TRADE JOURNAL, Dec. 27, 1945). In the table under "Test Specimen" the width for insulating board was given as 1 inch, whereas it should have been 3 inches.

The TAPPI Pacific Section will meet at the Montecello Hotel, Longview, Wash., on February 5, 1946. Dean Paul Dunn of Oregon State College is organizing a panel discussion on wood waste. This will include papers by Glenn Voorhies, Wood Products Company, Portland, Ore.; C. W. Richen, Crown Zellerbach Corp., Portland, Ore.; Prof. Bror Grondal, College of Forestry, University of Washington, Seattle, Wash.; and Arthur B. Anderson, Western Pine Association, Portland, Ore.

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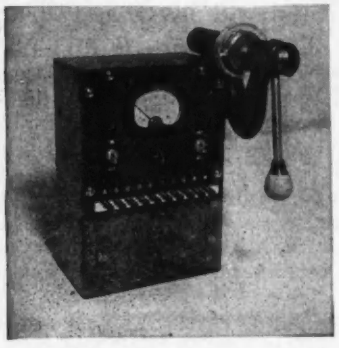

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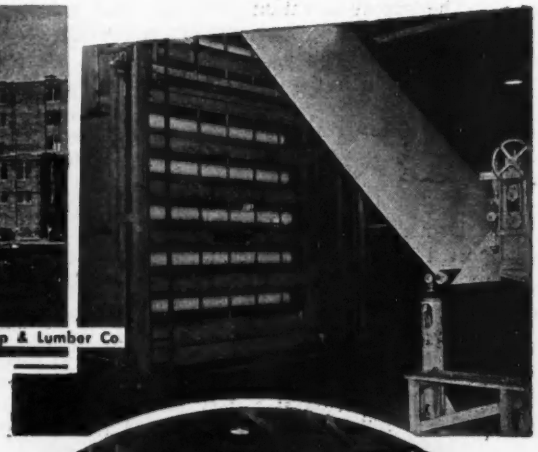

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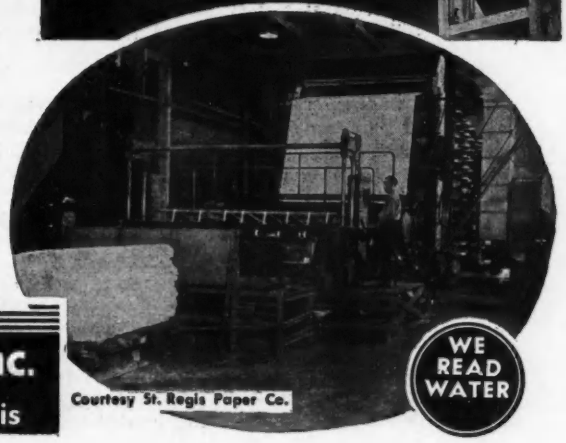

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New York Paper and Pulp Market Review

Demand and Output of Paper and Paperboard Continues Heavy This Week—Total Pulp Imports Last Year Were 672,264 Tons—Demand For Waste Paper Currently Heavy — Rags Are Active.

Office of the PAPER TRADE JOURNAL,
Wednesday, January 23, 1946.

Wholesale demand for major grades of paper and paper products is currently reported heavy with production at approximately 96% of six-day capacity. Production in mills has been largely converted to the manufacture of regular lines and an active market for paper and allied products appears assured for the first half of this year.

The index of general business activity for the week ended January 12 declined slightly to 133.3, from 133.8 in the preceding week, compared with 147.5 for the corresponding week in 1945. The index of paperboard production was 149.6, compared with 156.5 in the preceding week, and with 155.5 for the corresponding week in 1945.

Paper production for the week ended January 12 was estimated at 96.0%, compared with 88.7% for 1945, with 91.2% for 1944, with 88.0% for 1943, and with 103.9% for the corresponding week in 1942.

Paperboard production for the week ended January 12 was 93.0%, compared with 95.0% for 1945, with 93.0% for 1944, with 88.0% for 1943, and with 102.0% for the corresponding week in 1942.

Wood Pulp

The supply situation between wood pulp and requirements for paper-making continues somewhat narrow. The high production of 17,374,208 tons, to produce which the over-all industry operated at a ratio of 90.3%, was only possible by the excellent rate of imports of Swedish pulp. Total imports from V-E Day to the close of the year were 672,264 tons.

Rags

Demand for new cotton cuttings is currently reported heavy, with some mills reported to be unable to obtain all the tonnage required. All grades are active at this date. The price situation is strong with all quotations firm at ceiling levels.

Demand for old cotton rags is heavy at this date, with roofing mills less insistent, as inventories are currently reported at a very satisfactory level. Supplies are still being readily absorbed at ceiling prices.

Old Bagging

Trading in the scrap bagging market continues to be reported a matter of price. The current market is relatively strong outside of New York, but activity here is of a limited character at this date. In view of the long prevailing limited supplies any increase in buying is expected to create a strong price situation in old bagging.

Old Waste Paper

Demand for all grades of paper stock is reported heavy this week. Buying is heaviest in the bulky grades, as folded news and No. 1 mixed paper. The high grades are active but mill buying is reported in some quarters as less insistent than formerly. Prices in all grades are strong at ceiling levels.

Encourage Timber Salvage as Pulpwood

VANCOUVER, B. C., January 21, 1946—Rate of royalty for wood cut on lands previously logged for other products, which in the opinion of the B. C. department of forests, are suitable only for manufacture of pulp, has been set again for 1946 at one cent per 100 cut feet. The royalty has been set at the nominal sum to permit experiments in salvaging material which was formerly burned as slash. Two operators on the west coast of Vancouver Island are attempting the experiment for the first time under timber licenses.

The operators had sought to get their operations going last year, but because of labor shortages, little headway was made. The experiment had previously been attempted by the Comox Logging Company on Vancouver Island on E. and N. Railway land grants which is royalty free. These operations were not successful.

The government has set a nominal royalty to determine from the experimental operations whether it is commercially feasible to manufacture pulp from refuse of other forest operations.

Plank Joins Brackin Staff

WAYCROSS, Ga., January 20, 1946—The C. O. Brackin Pulpwood Company has just announced the appointment of Donald K. Plank, a veteran of World War II, as field representative for wood procurement. His headquarters will be in Jesup, it was stated, and he will supervise an extensive territory in the Jesup area. Mr. Plank received his professional training in the school of forestry of the University of Florida. He has had wide experience in practical forestry with the Florida forest and park service and for a number of years was connected with private forestry organizations.

The C. O. Brackin Pulpwood Company maintains headquarters in the K. & L. Building, this city. It is a dealer in pulpwood for the International Paper Company mill at Georgetown, S. C., which is rated as one of the largest pulp mills in the world.

Mr. Brackin said his company will maintain in its Waycross organization a large wood-procurement staff that will enforce and maintain the most progressive methods of wood procurement.

Research Workers Join Arthur D. Little

CAMBRIDGE, Mass., January 17, 1946 — Five new men formerly engaged in war research projects have joined the staff of Arthur D. Little, Inc., industrial research organization. Dr. W. H. Avery, physical chemist, was formerly with the Allegany Ballistics Laboratory. Dr. Richard Handrick, organic chemist, was at the University of Pennsylvania and Winslow A. Sawyer, mechanical engineer, was with the Army Ordnance Department. Raymond M. Hainer, physical chemist, was at Brown University, and Richard F. Messing, chemical engineer, served with the Office of Scientific Research and Development.

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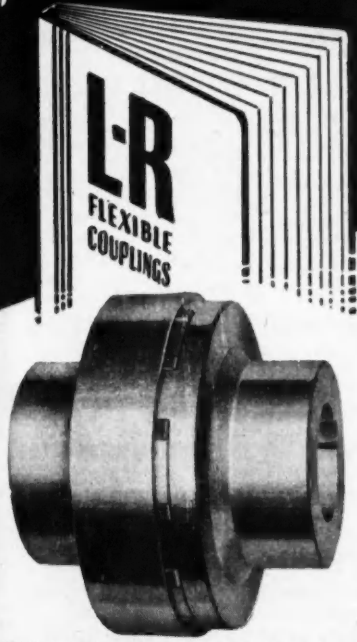
NEW YORK 17, N. Y.
Cables "Elofhans"

Here's Some Exceptionally Interesting **NEW** *READING!*



NEW! L-R Type "C" Pat. & Pats. Pend. Shrouded by extension of outside steel collar for protection, and minimum resistance even to airflow. 2 to 2500 h.p.

For the Pulp and Paper Mill Industries

L-R FLEXIBLE COUPLINGS

New revised L-R Catalog illustrates and describes Couplings particularly fitted to the special requirements of equipment for pulp and paper manufacture.

L-R COUPLINGS FOR EVERY DUTY

For correction of misalignment—take-up of shock and vibration—insurance of full smooth power flow. *Extremely quiet.* Resilient load cushion always in sight for inspection. NO SHUT-DOWNS FOR CHANGING. Couplings for every kind of service, 1/6 to 2500 h.p. SELECTOR CHARTS come with Catalog, leading you right to couplings you want, without tedious figuring. Wire or write.

LOVEJOY FLEXIBLE COUPLING CO.
5069 West Lake St. Chicago 44, Ill.

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, January 23, 1946.

BLANC FIXE—Quotations on blanc fixe continue unchanged. Demand is reported fair. The pulp is currently quoted at $40 per ton, in barrels, at works; the powder is currently quoted at $60 per ton, f.o.b. works.

BLEACHING POWDER—All-over current demand continues active. Supply situation is reported good. Quotations continue unchanged. Prices on bleaching powder range from $2.50 to $3.10 per 100 pounds, in drums, car lots, at works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 10,000 pounds or more, 24 cents per pound; 2,000 pounds, 24¼ cents per pound; less than 2,000 pounds, 24¾ cents per pound, f.o.b. shipping point. Imported 24 cents.

CAUSTIC SODA — Demand continues heavy. Deliveries continue slow. Supply tight in dry grades. Solid caustic soda is quoted at $2.30 per 100 pounds; flaked and ground is quoted at $2.70 per 100 pounds.

CHINA CLAY — Quotations on china clay are unchanged. Current demand is reported heavy. Supply short. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton, at mine. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Demand heavy with temporary short supply. Paper requirements fully met. Quotations unchanged. Chlorine is currently quoted at $1.75 per 100 pounds, in single unit tank cars, f.o.b. works.

ROSIN—No offerings and sales. "G" gum rosin is quoted at $6.74 per 100 pounds, in barrels, at Savannah; "FF" rosin at $6.70 per 100 pounds in barrels, at New York; seventy per cent gum rosin size at $6.95 per 100 pounds, f.o.b. works.

SALT CAKE—Prices on salt cake are reported unchanged for the current week. Consumption is reported increasing this week. Domestic salt cake is quoted at $15 per ton, in bulk. Chrome salt cake is quoted at $16 per ton. All prices in car lots, f.o.b. shipping point.

SODA ASH — Heavy demand continues for all-over requirements. Supply tight. Bulk lot shipments steady. Bagged lots still slow. Quotations continue unchanged. Current prices, car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Corn receipts and shipments higher. Purchases of cash corn for deferred shipment over 100,000 bushels; much above recent average. Prices steady. Starch prices continue unchanged. The pearl grade is quoted at $3.72 per 100 pounds; powdered starch at $3.83 per 100 pounds; all prices in bags, car lots, f.o.b. Chicago.

SULPHATE OF ALUMINA — Demand reported steady. Supply situation reported good. Quotations continue unchanged. The commercial grades are quoted at from $1.15 to $1.25 per 100 pounds, in bags, car lots, f.o.b. works. The iron free is currently quoted at $1.75 per 100 pounds, in bags, at works.

SULPHUR—Quotations on sulphur continue to conform to prevailing market prices. Demand active. Annual contracts are quoted at $16 per long ton, f.o.b. mines; the price at Gulf Ports is $17.50 per long ton.

TALC—Prices on talc continue unchanged. Demand good. Domestic grades are currently quoted at from $16 to $21 per ton at mines; Canadian at $24 per ton.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

Standard News, per ton—			
Roll, contract	*$67.00	@	—
Sheets	75.00	@	—
* OPA Maximum Price.			
Kraft—per cwt.—Carload Quantities Zone A, Delivered			
Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—
* OPA Manufacturers' Prices.			
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Toilet—1 M. Sheets—Per Case			
Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.20	"	—
Bleached, Jr.	3.20	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25
Boards, per ton—			
News	*50.00	@	—
Chip	*50.00	"	—
Sgl. Mla. Lt. Chip	*62.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$39.10	@ $46.60	$40.25	@ $47.25
100% Rag	32.20 "	37.75	33.35 "	39.25
85% Rag	.... "	....	29.90 "	35.00
75% Rag	23.00 "	27.00	24.15 "	28.25
65% Rag	.... "	....	22.80 "	27.75
50% Rag	18.70 "	22.75	19.90 "	24.25
25% Rag	16.40 "	20.00	17.55 "	21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$10.55	@ $12.75	$11.70	@ $14.25
No. 2	9.65 "	11.75	9.80 "	13.25
No. 3	9.20 "	11.25	10.35 "	12.50
No. 4	8.90 "	10.75	10.85 "	12.25

Colors $1.00 cwt. ex—

Free Sheet Book Papers—White, Cased Paper, Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@ $13.9
No. 2 Glossy Coated	12.40 "	14.0
No. 3 Glossy Coated	11.60 "	12.2
No. 4 Glossy Coated	11.15 "	12.7
No. 1 Antique (watermarked)	10.25 "	11.7
No. 2 Offset	9.60 "	11.0
A Grade E. F.	9.35 "	10.7
A Grade S. & S. C.	9.60 "	11.0
B Grade E. F.	8.85 "	10.2
B Grade S. C.	9.10 "	10.5
C Grade E. F.	8.55 "	9.7
C Grade S. C.	8.80 "	10.0
D Grade E. F.	8.25 "	9.5
D Grade S. & S. C.	8.50 "	9.7

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight Not Exceeding OPA Allowances.

Bl. Softwood Sulphite	$86.0
Unbl. Softwood Sulphite	74.0
Bl. Hardwood Sulphite	83.5
Unbl. Hardwood Sulphite	71.5
Bl. Mitscherlich	81.0
Unbl. Mitscherlich	72.00 @ 82.0
N. Bleached Sulphate	86.0
S. Bleached Sulphate	79.5
N. Semi-Bleached Sulphate	82.0
S. Semi Bleached Sulphate	75.5
N. Unbl. Sulphate	73.0
S. Unbl. Sulphate	63.5
Bl. Soda	76.0
Unbl. Soda	73.0
Groundwood	50.0

Transportation Allowances

Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices

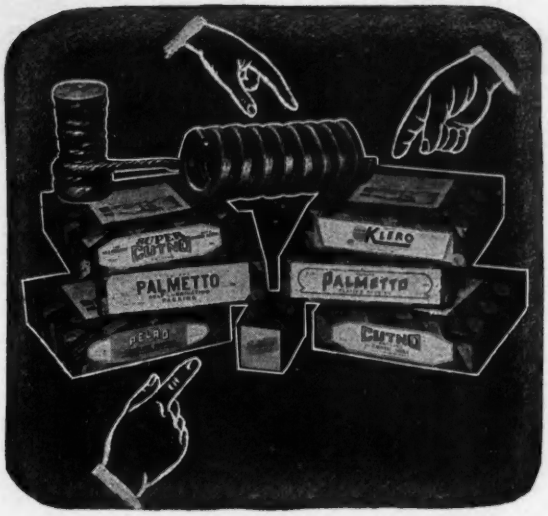
Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.50	@	7.25*
Silesias No. 1	—	"	5.75*
New Unbleached	6.75	"	7.50*
Blue Overall	—	"	5.50*
Fancy	—	"	3.50*
Washables	—	"	3.00*
Bleached Khaki Cuttings	—	"	4.25*
Unbleached Khaki Cuttings	—	"	3.50*

*OPA Maximum Prices



The *RIGHT* Packing For Every Need

A line of packings that is COMPLETE, yet SIMPLE; because its eight types cover practically every fluid and service.

Palmetto and the other Greene, Tweed Packings are distinguished by their self-lubricating feature as well as by the superior grade of asbestos or other yarns of which they are made. The self-lubricating quality is developed by an exclusive manufacturing process, in which each separate strand is saturated with a special lubricant, compounded for each specific service, and impregnated BEFORE braiding, plaiting or twisting.

This is why you can depend upon extra-long service, with minimum friction and maximum protection to rods, shafts and stems, when you use Greene, Tweed Packings.

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PALMETTO Hight Pressure Folded Asbestos Gaskets
PALMETTO Asbestos Metallic Sheet Packing
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PALMETTO

PALMETTO for steam, water, air • PELRO for oils • CUTNO for alkalis • SUPER-CUTNO (blue asbestos) for acids. • KLERO for foods

Self-Lubricating **PACKINGS**

For Over 50 Years

APPLETON FELTS
make good paper

Appleton Woolen Mills

APPLETON · WISCONSIN

Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Thirds and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.30	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

Pre-War Quotations
All Prices Nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.90	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	3.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shappories	1.30	"	1.45
New Shappories	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.25	@	3.30
Wool Tares, light	3.25	"	3.50
Wool Tares, heavy	1.50	"	1.75
Bright Bagging	1.35	"	1.50
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	5.90	"	—
No. 1 Sisal Strings	*4.00	"	—
Mixed Strings	2.00	"	—

* OPA Maximum Prices.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Mixed Books	1.10	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Mixed Ledger, colored	2.00	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.95	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	1.10	"	—

Twines

All Prices Nominal
(F. o. b. Mill)
(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17½	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.25	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—
(Hard Fiber)			
Medium Java	.16	"	—
Max. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill)

Shirt Cuttings—	
New White No. 1	.07¼
New White No. 2	.05¼
Light Silesias	.05¼
Black Silesias, soft	.03¼
New Unbleached	.07½
Washable Prints	.04¼
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable Shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¼
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¼
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cottonades	.03¼

Domestic Rags (Old)

White No. 1—Repacked	3.80	@	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
White No. 2—Repacked	2.90	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	@	3.90
No. 1 Clean bright—			
Sisal Strings	.04	"	—
No. 2 Clean bright—			
Sisal Strings	.03	"	—
Sisal Jute	.02½	"	.02¾
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.80	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	2.25	"	—
Ground Wood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Overissue News	1.10	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	2.75	@	2.90
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	* —	"	4.00
Mixed Rope	—	"	1.55
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.00	"	3.25
South American	—	"	3.25
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25	"	—
Aust. Wool Pouches	—	"	3.60
New Zealand Wool Pouches	—	"	3.90
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.25
Paper Mill Bagging	2.50	"	3.00
No. 2 Roofing Bagging	1.35	"	—

* OPA Maximum Prices.

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices, Baled

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	2.25	"	—
Ground Wood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Overissue News	1.10	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	2.75	@	2.90
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	* —	"	4.00
Mixed Rope	—	"	1.55
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.00	"	3.25
South American	—	"	3.25

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.30	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—
Misc.	2.15	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Ledger, colored	2.00	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Box Board Cuttings	.72½	"	—
Kraft Corrugated Cuttings	2.25	"	—
Old Corrugated Containers	1.40	"	—
Overissue News	1.00	"	—
No. 1 News	1.00	"	—

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¼	"	.05
New White No. 1	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06¼
Underwear Cutters, Bleached	.06¼	"	.06¾
Underwear Cutters, Unbleached	.05¾	"	.06
Silesias No. 1	.06	"	.06¼
New Black Silesias	.03	"	.03½
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Chevinets	.05¾	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03¾	"	.03¾
Corduroy	.03¾	"	.03¾
New Canvas	.06¾	"	.07
B. V. D. Cuttings	.06¾	"	.07

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	2.20	"	—
Old Blue Overalls	2.25	"	2.30
Thirds and Blues, Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—
No. 2	1.45	"	—
No. 3	1.35	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.30	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—